JOURNAL OF ELECTRICITY

POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

Entered as second-class matter May 7, 1906, at the Post Office at San Francisco, Cal., under the Act of Congress March 3, 1879

VOL. XXII NO. 22 | SAN FRANCISCO, MAY 29, 1909 | PER COPY, 10 CENTS

Electric Appliance Company

HIGH GRADE **ELECTRICAL SUPPLIES**

ELECTRIC APPLIANCE COMPANY — THE QUICK SHIPMENT HOUSE

AMERICA'S LARGEST ELECTRICAL SUPPLY HOUSE

726 728 730 MISSION ST. SAN FRANCISCO.

OKONITE WIRE

OKONITE — TRADE MARK REG. U.S. PATENT OFFICE.

THE STANDARD for RUBBER INSULATION

Okonite Tape, Manson Tape,
Candee Weather-Proof Wire,
Candee (Patented) Potheads.

THE OKONITE COMPANY,

253 Broadway NEW YORK

PARANITE — TRADE MARK

INDIANA RUBBER AND INSULATED WIRE CO.

Manufacturers of Paranite and Peerless Rubber Covered Wires and Cables
Underground, Aerial, Submarine and Inside Use
Telephone, Telegraph and Fire Alarm Cables
All Wires are Tested at Factory JONESBORO, IND.

Electric Appliance Company
728 Mission St., San Francisco Pacific Coast Agents

Standard Underground Cable Co.

MANUFACTURERS OF

BARE AND INSULATED WIRE AND CABLES

Chicago Pittsburg Philadelphia Atlanta
New York Boston St. Louis San Francisco

PACIFIC COAST DEPT. --- A. B. Saurman, Manager
Sub-Office—Los Angeles, Cal. Shreve Bldg., San Francisco

Phillips Insulated Wire Co.

PAWTUCKET, R. I.

INSULATED WIRES TRADE MARK "O.K." AND CABLES

"O. K." WEATHERPROOF
"PARAC" RUBBER COVERED

BLACK CORE TRADE PARAC MARK RUBBER WIRES

COMPLETE STOCKS CARRIED BY
OUR PACIFIC COAST AGENTS

California Electric Co. LOS ANGELES
Electric Appliance Co. SAN FRANCISCO
Western Electric Co. SEATTLE

Specify....

BROOKFIELD GLASS INSULATORS

The Standard

PACIFIC METER CO.

MANUFACTURERS OF

Wet and Dry Gas Meters, Station Meters, Provers, Gauges, Etc.

301 SANTA MARINA BUILDING
California and Drumm Sts. San Francisco

VULCAN ..... Refrigerating and Ice Making Machinery

MANUFACTURED BY

VULCAN IRON WORKS

Office: 702 Atlas Bldg., 604 Mission St.
Works: Francisco and Kearny Streets San Francisco

FOR INDEX TO ADVERTISEMENTS SEE PAGE EIGHT

We Have Moved

To Permanent Quarters

¶ This will mean quicker shipments and better service to our customers now that we are settled and our organization is complete.

Remember us with your next order---we carry a full line of

"STANDARD"

SUPPLIES and APPARATUS

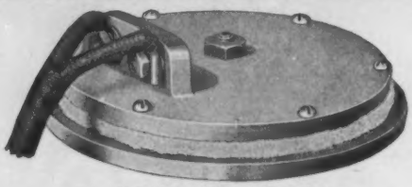
Yours for good treatment

Standard Electrical Works

669-671 Mission St. 168-170 Minna St.
San Francisco

STERLING

"The Modern Electric Supply House"



SELF ATTACHING HEATER

The above cut shows our latest SELF-ATTACHING HEATER, which may be adapted to any metal vessel used for water heating. The method of attaching is unique in itself, no tools being necessary. We carry these in all voltages and amperages.

The USES of our little heater are many. It can be attached to any of the following with but little trouble: Sterilizers, coffee urns, chafing dishes, five o'clocks, water urns, etc. Write for prices and descriptive matter.

Sterling Electric Company

133-139 New Montgomery St., San Francisco Phone Kearny 2591
Private Exchange connecting all departments

Tungsten Lamps

AND

Holophane Reflectors

ALL THE NEW TYPES
FOR IMMEDIATE DELIVERIES

California Incandescent Lamp Co.

ROBERTS BLDG., SAN FRANCISCO

The Latest KLEIN Production

"QUICK SAMSON"

MESSENGER WIRE GRIP

It is of vital importance to all having strand wire to handle to investigate this grip.

A Quick, Safe, Secure Device for Pulling Messenger or Strand Wire,

No. 363-S. The jaws move simultaneously; the alligator teeth grip into the spirals of the strand wire. Contact being at many points, it does no damage to the wire.
Made in several sizes.
No. 363-B. For trolley wire, same as above, but the jaws are only roughened.
Special prices quoted on request. Write for New Catalogue. 110

MATHIAS KLEIN & SONS

95 W. VAN BUREN STREET CHICAGO, ILL.

BRYAN - MARSH LAMPS

CARBON
TANTALUM
TUNGSTEN

Stocks carried in New York, Chicago, Cincinnati, Minneapolis, Denver, Oakland

IN SAN FRANCISCO BY

C. I. McColgan Co., 789 Mission Street
California Inc. Lamp Co., Roberts Bldg.
Standard Electrical Works, Roberts Bldg.

SIMPLEX

SPECIAL CONDITIONS Met by SPECIAL DESIGN

Prompt Attention

INSULATED WIRES and CABLES
RUBBER — CAMBRIC
THE SIMPLEX ELECTRICAL CO. BOSTON

ALL TYPES RUBBER INSULATED

WIRES and CABLES

Telephone-Electric Equipment Company

Pacific Coast Sales Agents

612 HOWARD STREET SAN FRANCISCO
SEATTLE LOS ANGELES

SIMPLEX

For Suburban Underground Connections

Use Steel Taped Lead Covered Cables No Conduit—Quickly Installed Few Joints

INSULATED WIRES and CABLES
RUBBER — CAMBRIC
THE SIMPLEX ELECTRICAL CO. BOSTON

H. H. SINCLAIR

— *See Page 430*

JOURNAL OF ELECTRICITY

POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy.

VOLUME XXII. SAN FRANCISCO, MAY 29, 1909. NUMBER 22

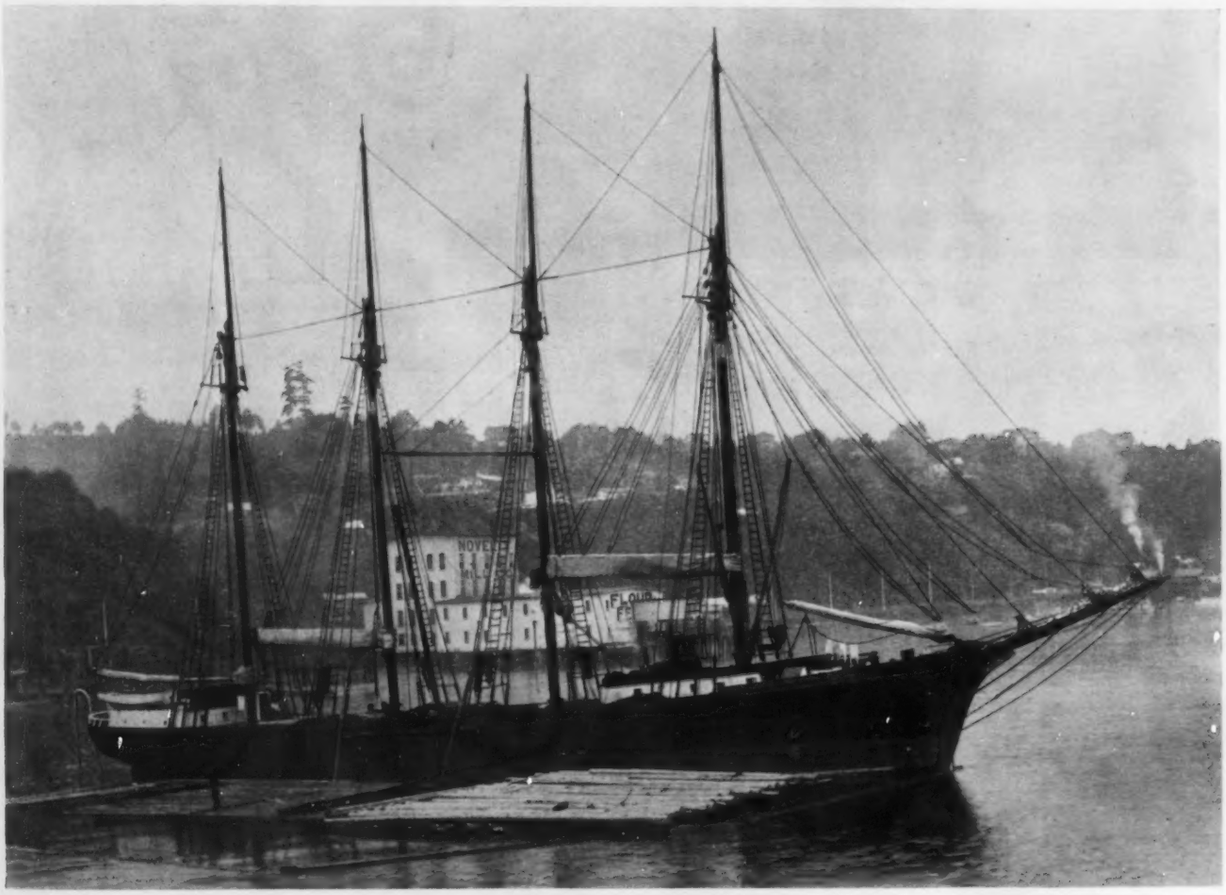
SOMETHING ABOUT THE "TEREDO."

BY C. H. JOHNSON.

The work of harvesting and shipping poles for the use of the power, telephone and telegraph companies on the Western Coast is one of the most important industries of the rapidly growing Northwest and this business in recent years has grown to a magnitude that the general public can hardly appreciate.

One of the most serious obstacles to be overcome in the handling of the pole business is the "teredo," that little insect, infinitesimal in size, which has been the bane of ship owners and the despair of wharf and ferry companies on the Pacific Coast for years.

The teredo, invisible at the time of its attack, grows rapidly as it works its way into the wood from which it draws its sustenance and its increase in size is easily traced by the constantly enlarging holes bored in the wood as it grows in strength from day to day while engaged in making a veritable honeycomb of a once sound and sturdy piece of timber.



Vessel Loading With Poles in the Northwest.

It is a well known fact that the teredo does not exist in fresh water nor can it live when transferred from fresh to salt water, but dies immediately on being submerged in other than the ocean's brine. It is the practice of shippers therefore to store their stock of poles in the fresh water lakes of the Northwest until ready for loading. The handling of poles has been reduced to a science and from the time they leave their homes in the forests of Washington and Oregon on their trip down the river, in their journey to the sea, they are in the hands of experienced and careful men, and guarded against the waiting teredo at the sea shore.

When ready for loading the poles are towed from their storage in fresh water to the ship. This transfer is made in small lots and the stock expeditiously handled in order to limit the period of immersion in salt water to the minimum.

It is only an ordinary pole, but the experienced buyer and construction superintendent knows full well

Fragments of Washington Cedar Showing the Work of the "Teredo."

the importance of this care and its relation to the future life of his pole line.

The teredo known to the ancients as the "ship worm" dates from before the time of man; traces have been found among the fossil remains of the Eocene of Great Britain and France and they are mentioned in the writings of Pliny and Ovid.

In 1733 great consternation was caused in Holland owing to the threatened inundation of the country through the destruction of the dykes by teredos.

The teredo, while only an atom at the beginning of his work, rapidly develops until he reaches the length of three feet. He burrows generally, though not always, in the direction of the grain and it is an indisputable fact that one burrow is never found to break into nor cross another; should he accidentally lose his bearings and tap an adjoining burrow he invariably switches back to his own territory and continues on the even tenor of his way. This is an example of "team work" worthy of careful study as showing what can be accomplished by good organization and strict attention to business.

Electric Railways in Norway have been unknown until recently. The first one has just been placed in service. It is nearly 30 miles long and connects Thamshavn and Lokken. The single phase system is used, with catenary line construction and 30-ton locomotive.

THE REAL PURPOSE OF THE AIR BRAKE.[1]

BY W. S. BARTHOLEMEW.

PART II.

I have explained to you what we call a "triple valve" and why we call it so. Here is a diagram of a plain triple valve:

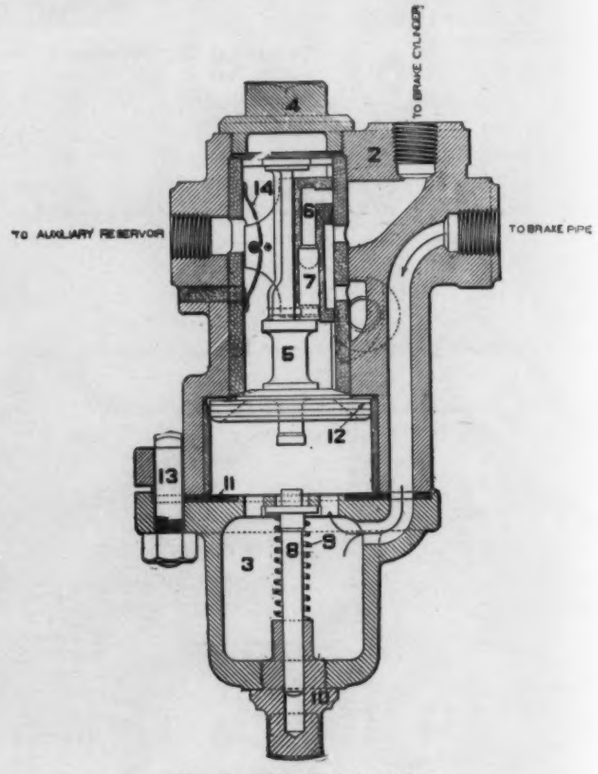


Fig. 3. Plain Triple Valve.

This will give you some idea of the construction of the functional part of the air brake and, to go back some in the talk, what we called the plain automatic brake was that part of the equipment as we have it here. Most people think the air brake is a series of these valves connected directly together by the brake pipe going into one side and out the other, and so on serially through the train. I will not touch on the engine equipment tonight, because, as a matter of fact, the demonstrations this summer were to illustrate the air brake action on the trains back of the locomotive and to cover the features of the locomotive equipment would take considerable time.

So I am going to begin, leaving the engine out of the discussion, and show you that we have first what we call the "brake pipe." The train men call it a "train pipe." The reason we call it a brake pipe is because in passenger trains we have several pipes through the train. In electrically operated trains on which we have electric compressors on the different vehicles, we run a third or perhaps a fourth pipe through the train for other purposes. So we distinguish between the different pipes: A main reservoir pipe, a brake pipe, a control pipe, etc.

Most people have an idea that this pipe goes right through the air brake proper, i. e., that the pipe

[1] Part I of "The Real Purpose of the Air Brake" appeared in our issue of May 22, 1909.

goes through the triple valves, so to speak, but one very important thing I want to point out to you, which has a great deal to do with the air brake art, is the fact that the brake pipe exists through the train and the air brakes on the different vehicles are connected only to laterals on the brake pipe.

Illustration No. 4 shows them very short; but as a matter of fact, they are six or eight or ten feet long, according to the location on the car. I want to point out to you that the development of the air brake art has to do with the serial action from vehicle to vehicle; but things that happen in those laterals and have an effect upon the brake upon the car must affect the conditions of the air pressure in the main pipe. On each vehicle we have a reservoir which we commonly call the "auxiliary reservoir," which carries a volume about two and one-half times the volume which is required by the brake cylinder. The "brake cylinder" is that part of the equipment into which the pressure is admitted which works finally through the movable brake cylinder piston

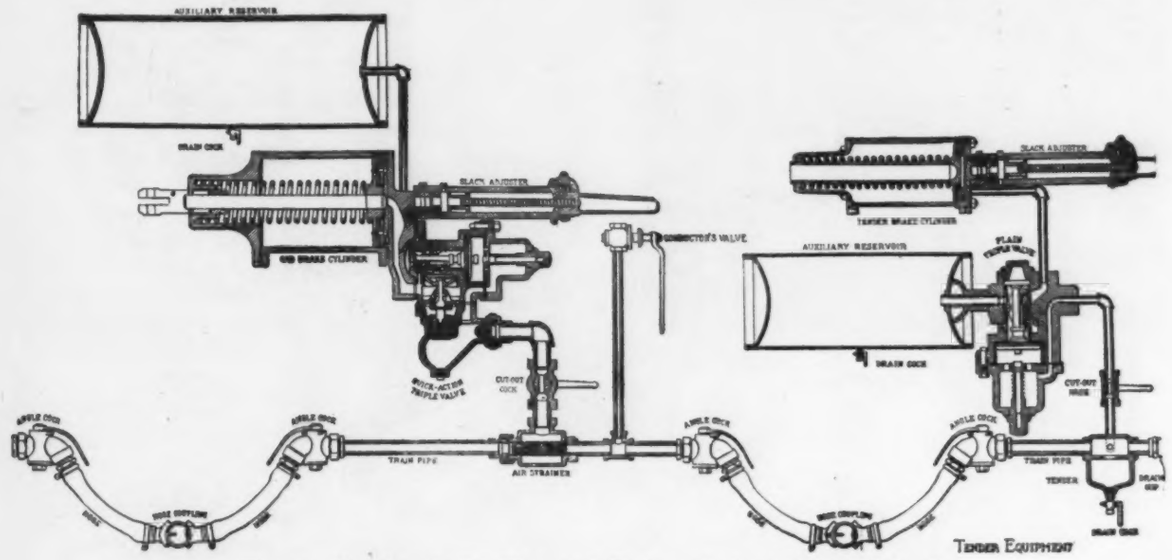


Fig. 4. Showing Brake Pipe and Equipment Connected to Laterals.

and the levers to the shoes on the wheels. That stored volume in the auxiliaries, the condition of it, the time that it takes in making reductions and the time that it takes to restore it, are what have to do with the engineering difficulties, not only in the development of the air brake, but in the use of it.

The important thing in the equipment is the triple valve, and the one shown in Fig. 5 is one of the latest improved type.

It is primarily what we call a "quick action triple valve"; the principal feature of it is a piston to which is connected the slide valve which you all understand controls the ports. The whole trick is to get that piston to move, then to stop it and then return it to its normal position at the will of the man on the engine. That, primarily, is the whole secret.

On the engine we have a "regulating valve," called in our practice, a "feed valve," which supplies the brake pipe against leakage and maintains a certain pressure, say 80 pounds. That pressure then comes up to the front, or brake pipe side, of the triple valve piston. What we must first do before we can made a brake application is to get air into the auxiliary reservoir. The only way is by a little port through the slide valve and through a little groove over the top of the triple valve piston, which we call a "feed groove." A change in the size of that groove either larger or smaller would materially affect the application and release of brakes in long trains.

You will be interested to know that that air passes the feed groove at the rate of about one pound per second; that will give you some idea as to how long a time it takes to charge up the auxiliaries preparatory to making a brake application and to secure a return to the pressure we had originally. When time enough has elapsed to get the auxiliary reservoir pressure up to the pressure that the brake pipe pressure is regulated at we are ready to make a brake application. The triple valve piston having been shoved over by the original pressure stays there until the auxiliary reservoir is charged and when we get pressure on both sides of the piston the same, it still stays there; then we have 80 pounds on the brake pipe side and 80 pounds on the auxiliary reservoir side, and nothing in the brake cylinder. The auxiliary reservoir being some two and a half times the size that we shall require in the brake cylinder with the brake cylinder piston's longest travel—that is about the way we ordinarily figure it—means that for each pound we let out of the auxiliary we will put approximately two and a half pounds in the brake cylinders. So that when I come to use some of the illustrations in the report and when we say we made a 5-pound application, we do not mean that we put five pounds in the brake cylinder; we mean practically twelve and one-half pounds. We make a 5-pound application by letting five pounds of pressure out of the brake pipe. Then what happens? The piston moves over toward the brake pipe side, which we have let down to 75 pounds. That would mean that we have about 45 pounds force to move that piston over and to take the slide valve with it until the auxiliary reservoir pressure is connected up through a port

which opens up to the brake cylinder. As soon as the auxiliary reservoir is open to the atmospheric pressure in the brake cylinder, the 80 pounds very soon—in fact, almost immediately, goes down to slightly below 75 pounds, which puts about 12½ pounds in the brake cylinder as I have explained; but, as soon as the auxiliary reservoir pressure gets down to 75 pounds, we have then the same pressure on both sides of the triple valve piston, but, instead of the auxiliary reservoir pressure stopping at 75 pounds, it continues reducing as I just said, enough to permit the brake pipe pressure on the other side of the piston to move the piston and valve and close the ports, thus stopping the brake application.

I had another set of charts, but, unfortunately, I had not room to put them up. I had among those charts a diagram showing this piston in the different

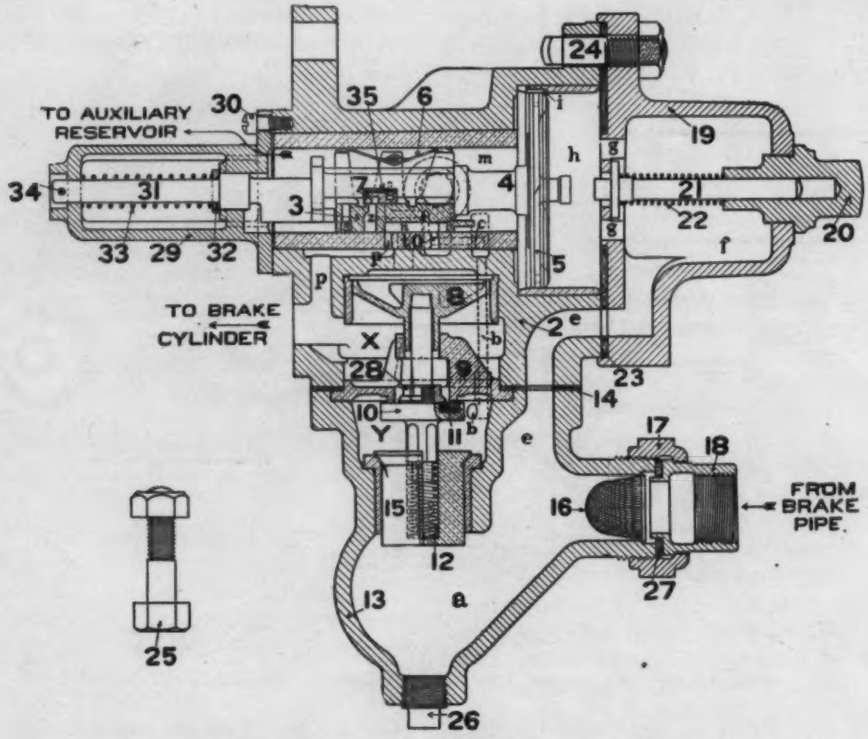


Fig. 5. K-2 Improved Quick Action Triple Valve.

positions that occur through these different movements. I might have mentioned that it takes about one pound and a half differential on the piston area of about nine inches, i. e., about 13 or 14 pounds force to move the piston at all with the pressure on top of the slide valve.

First we want the piston to move, but a much more important thing is in wanting it to stop. If it does not stop in service position, another thing occurs; that is, instead of getting 12½ pounds in the brake cylinder, we would have opened the emergency port and secured about 60 pounds; so that, while it was important to have this piston start to move, the first consideration being to get it to move, the second to get it to stop where we want it to stop, and the third consideration is to get it to stay there. That it what causes a lot of trouble, the fact that it fails to stay in a certain place. The operation described is called a "service application," a light service application, i. e., that it was practically the least use we could make of the brake as far as long freight trains are concerned.

I might tell you right here what the "emergency application" is, because that has to do very largely with one of the epochs of the air brake. I have explained to you that the triple valves are on the vehicles connected to the laterals and they in turn are connected to the brake pipe and on the train that we had this summer the brake pipe was 3,700 feet long. Imagine having 80 lateral connections on a 3,700-foot pipe and the end you are aiming at is to get every one of those triple valves on every one of those laterals to do the same thing at the same time. You engineers know that if we start to let the air out of that pipe on the front end we can let it clear down to zero before we get much of a reduction on the rear end; consequently we could not depend entirely on this opening at the front end. We have to inject a feature into these valves which, when desired, will pick up that serial action, as we call it, that will cause the pistons to go themselves into the position that we want them to go into, and stay where we want them to be put. But, in that little instant of movement from the position where they are at rest to the emergency position, they do a very important thing; they take a little air out of the lateral and consequently out of the brake pipe, which accomplishes two purposes; the first is to reach over to the next vehicle with the little differential, as we call it, thus created, and set the next triple valve piston in motion, and it in turn takes up that serial action and moves the next one, and so on until all the brakes are applied in the shortest possible time.

The second thing accomplished is to put the air into the brake cylinder that is thus taken out of the brake pipe, assisting in building up pressure to force the brake shoes against the wheels, the emergency port from auxiliary reservoir to brake cylinder having been opened by the slide valve in the meantime, permitting about 20 per cent more brake cylinder pressure to be secured than if the brake pipe pressure had been permitted to escape to the atmosphere. That is what is termed an "emergency application" of the brakes.

When the engineer starts to make a 5-pound service reduction it is a long time before that reduction reaches the rear end and here is where one of the improvements that has not been in brakes before comes in, that is, in the triple valve shown in Fig. 5. When we had the 30-car train limit, prior to 1887, there was no arrangement in the valves at all to assist in transmitting serial action, even in emergency. It was just the plain triple valve shown in Fig. 3, and all reduction to make these triples act, no matter how long the train was, was by the discharge of brake pipe pressure to the atmosphere of the brake valve.

You all know of the great fortune that has been made out of the air brake on the fundamental patents. The feature of transmitting serial action in the manner described is the fundamental Westinghouse principle, which has never been gainsaid throughout the entire life of the patents; that is, an arrangement of operating parts and ports in the triple valve which, when an immediate reduction was made out of the brake pipe at the head end of the train, the piston would come over so far that it would set a new set of parts into action and open up a connection to the lateral and thence to the brake pipe and the brake pipe pressure would be applied to the brake cylinder piston. Two things thus happened, as above described. That was the fundamental Westinghouse patent of taking air out of the brake pipe to create serial action through the train and putting it into the brake cylinder and not discharging it to the atmosphere. Other brakes were afterward invented, and one is being marketed to some extent in which, instead of putting the brake pipe air into the cylinder, they discharge it to the atmosphere. That practically was the way they attempted to get around the Westinghouse patent; but, about that time the fundamental patent expired, i. e., the part of the patent that procured that impulse through the train in emergency applications, had expired.

The operating parts of the triple valves which transmit the serial action as described are called the "quick action" parts and were added to the triple valve about the year 1887.

The need for the improvement was illustrated in the extensive series of demonstrations called the "Burlington brake trials," very similar to the demonstrations made in California this summer and for practically the same purpose, i. e., to illustrate the long time that it took between the application of the brakes on the front end and the application of the brakes at the rear end with the old method of letting the air out of the brake pipe at the head end only, the difference, however, being that the "Burlington brake trials" were confined practically to the use of the brakes in emergency, whereas, the Southern Pacific demonstrations this summer were confined to illustrating the improvements in the triple valves for use in the ordinary requirements, i. e., uses for controlling the trains in daily service.

Trains have developed from the 50-car trains of that day to 80 and 100-car trains today. So we now find it necessary to inject a serial action hastening device in the triple valve to secure an improvement in the serial action in what we call the "service" use of the brakes, that is, not in emergency. When an emergency application became necessary with the original plain automatic brake it took about half a minute to get the brakes applied on the rear end. With the quick action automatic brake which Mr. Westinghouse invented immediately after the Burlington brake trials, it takes about 4½ seconds; and

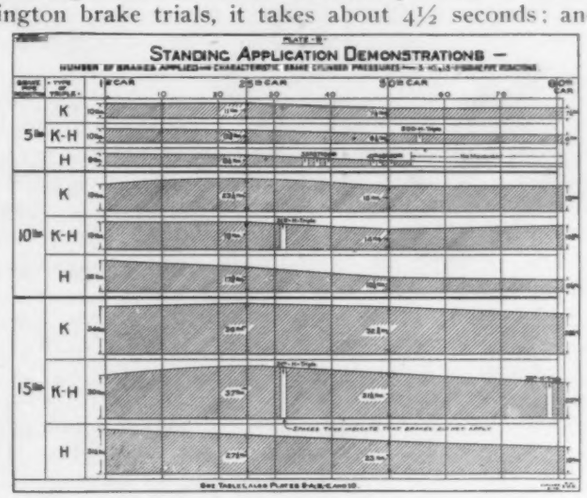


Plate 9.

all we have attempted to do with any of these improvements is to apply the brakes faster than the slack can run in.

Mr. Babcock: Will you not explain the reason for that, why the slack makes the damage?

Mr. Bartholomew: I think I can do that better by having you turn to the report.

Mr. Babcock: I mean the mechanical reason for it, the action of checking the head of the train.

Mr. Bartholomew: If you will turn to page 29 of the book that you have in your hand, you will see some very good reasons for it. This does not exactly represent the old emergency action, but, if you will look on Plate 9, there are shown some diagrams which represent the condition of the pressure in the brake cylinders through the train at the completion of the applications.

These diagrams show only the pressure; I will show you the time afterward; but this is after the pressures are the fullest from any given brake application. The first three diagrams on the top of the page illustrate three different 5-pound applications with different mixtures of equipment, these 5-pound applications being made, as I have explained, by taking 5 pounds out of the brake pipe and, in turn, 5 pounds out of the auxiliary reservoirs, and securing the pressures in the brake cylinders through the trains, as indicated. We have lettered these for convenience, KK and HH. Look at the third line, in

which you will find with the H triple valve we have nine pounds on the first car. The records in this particular demonstration were taken with the train at rest, and at four places on the train. We know, by making tests, that these points from which we have drawn the lines from point to point represent the average conditions. We have nine pounds in the first car, 8¼ in the twenty-fifth. But, before we got to the fortieth car, the brakes began to skip, as on the thirty-fifth, thirty-seventh, thirty-ninth, forty-seventh, forty-eighth, fiftieth and after about the fifty-third car—perhaps fifty-fourth—we did not get anything. You can readily see what happened. This will represent a similar action to the emergency action in the old plain triple. When we got the brakes on at the front end, if the train was going at the rate of 30 miles per hour, we would get a retardation on the front end so much quicker than at the other end that there was a great force developed through the slack running in.

You can now appreciate when trains got so long that what we call the service application failed to go through the train even with all brakes cut in, we knew it failed long before any one else knew it, and it was necessary to set about devising improvements so that the brakes would run the serial action completely through the train with light applications and quicker than before.

Remembering the five conditions mentioned earlier in the evening, which made it seem advisable to avoid changing the equipment on the cars in any way, and, if possible, bring about the improvement by making the changes in the locomotive equipment, we attempted to hurry up the service applications by letting the air out of the brake pipe faster on the engine than formerly, and every possible scheme was tried along these lines to bring about the desired result, but without success, and it became necessary, therefore, to add improvements to the triple valves on the vehicles through the trains to accomplish the desired purpose.

The improvement which insures the serial action of the brakes running completely through the train and in shorter time than formerly we have called the "quick service" feature, which hastens the time of serial action of the brakes through the trains in service applications in a similar way to hastening the time of serial action in emergency, as I have explained to you, except in a lesser degree, the emergency action remaining the same as before, the service time, however, being practically cut in two and running completely through the train.

This result is brought about by each improved triple valve, which we call style "K," making a local reduction of brake pipe pressure on each vehicle by taking a quantity of air out of the brake pipe and admitting same to the brake cylinder similar to the emergency action which I have explained, this small local reduction thus made setting the triple valve in action on the next adjoining vehicle, this latter action resulting, also whether the next triple be of the improved or any other type. The brake pipe air thus placed in the brake cylinder being equal approximately to the displacement of the brake cylinder piston during this movement, thus permits the air then admitted from the auxiliary reservoir to build up pressure immediately, making a much more prompt application of the brakes on the vehicles in addition to the shorter time of serial action through the train.

This local reduction produced by the quick service feature results in complete serial action of the brakes through trains of any length with only very light brake pipe reductions on the head end and secures the effective use of the brakes uniformly on all vehicles instead of building up heavy braking efforts on the head vehicles in attempting to get the brakes to apply on the rear end of the train, as heretofore.

The first thing we are after is to get all of the brakes in the train to operate. The second is to get them to operate faster than the slack can run in, and the third is to get uniform braking efforts throughout the train. Plate 9, as shown, graphically illustrates the results of different brake applications as represented by the brake cylinder pressures throughout the train at the end of the applications. When it is remembered that the "K" triple valves operate throughout the train in less than one-half the time serially of the old style "H" valves, the diagrams shown are unusually significant. The first three diagrams show the lightest possible service application with all improved triples, then half improved and half old style, and then with all old style, and it will be noted that all of the brakes in the 80-car train operated with the light application with the "K" triple valves and that there was very uniform final pressure in all of the cylinders. The diagrams shown of half new and half old illustrate similar uniform results, which is brought out by the fact that each improved "K" triple valve favorably affected the old style valves on the adjacent vehicles, the equipment being distributed throughout the train alternately. The third diagram illustrates what I have been describing to you as the loss of serial action back in the train, the first brake failing to apply in this particular demonstration being the thirty-fifth, and then skipping miscellaneously to the fifty-third and then none applying back of that. The sixth and ninth diagrams represent the unequal braking efforts which resulted from attempting to get the brakes to apply on the rear end of long trains with old style triple valves.

In the sixth diagram will be noted a difference of 13½ pounds brake cylinder pressure between the front and rear end of train in marked contrast to one pound difference between the front and rear end, as shown in the fourth diagram of a similar application with all improved triple valves. The comparisons shown on Plate 9 are of still further interest, when taken into consideration with the time comparisons shown on Plate 2, from which it will be seen that the eightieth brake applied in 13 seconds with the "K" triple valves and in 27.7 seconds with the old style "H" triple valves in the applications from which diagrams 4, 5 and 6 on Plate 9 were made. I have stated before that we have attempted to cut the time of serial action in two and the comparative time shown on Plate 2, being 13 seconds for the eightieth car with "K," as compared with 27.7 seconds with old style of triple valves, illustrates our claim that this has been accomplished. This improvement in time of serial action which we consider is now faster

than the slack can run in through long trains, will probably serve until the entire elimination of time of serial action can be accomplished through electrically operated equipment, which, of course, for a long time to come, will practically be impossible, as far as freight cars are concerned.

The operating results of securing brake applications through the train with light brake pipe reductions, as illustrated on first, second and third diagrams on Plate 9, are shown on Plate 13.

The trains having the different triple valve equipment were accelerated to different speeds in miles per hour shown on the plate and stops made with the

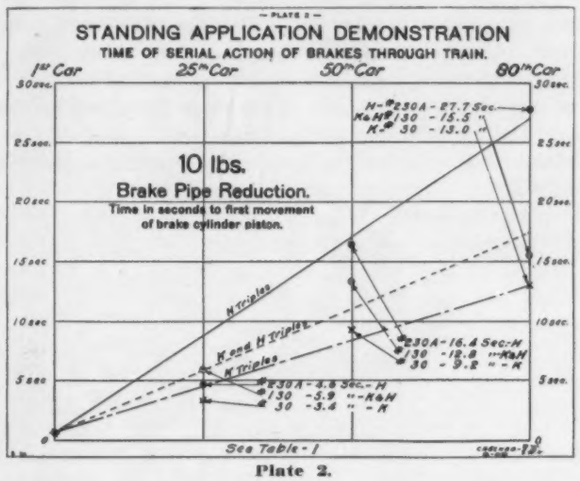


Plate 2.

5-pound brake pipe reductions and the comparisons of stops from 30 miles per hour is what might be expected from the areas of the first three diagrams shown on Plate 9, as the loss of serial action in the train as illustrated on the third diagram permitted the train to run 4,138 feet after the brake application was made, in marked contrast to the stop in 1,700 feet by securing an effective use of all brakes in the train, as illustrated by the first diagram on Plate 9.

The first question Mr. Kruttschnitt asked me when explaining the results of the demonstration to him was: "How will the new equipment work with the old?" and by referring to the middle diagram on Plate 13, showing the stops from the different speeds with half new and half old style triple valves, it will be seen that the results were similar to those with all improved triple valves, and this accounted for by the fact that each new triple valve favorably affected the equipment on the neighboring vehicles, as I have before explained to you, thus living up to the fourth limitation mentioned earlier in the evening, that any improvement injected into air brake equipment must improve the old equipment with which it must operate through the transition period. The results of these demonstrations, as illustrated on the diagrams, show that the improvement to the old equipment on adjacent vehicles made an increase of about 50 per cent in their efficiency.

Mr. Babcock: How were the different types of equipment distributed throughout the train?

Mr. Bartholomew: Alternately. You will also be interested to know that in another demonstration we put them in blocks of five; in still another demonstration in blocks of ten; and that the time of serial action did not vary two seconds, the stops were made in about the same distances as shown on Plate 13. We made them alternately in this case for a purpose. We wanted to show that the new triples would improve the old ones on the intermediate vehicles so that the train control would be almost as good with half and half as with all new, as illustrated by the middle curve on Plate 13.

One of the benefits of the improved time of serial action and uniform distribution of braking effort through the train with service applications is not really shown in any of the diagrams in the air brake report, but, to make a record of the reduction of the shocks internally in the train by the application of the brakes faster than the slack would run in, we had the dynamometer car in the train placed usually

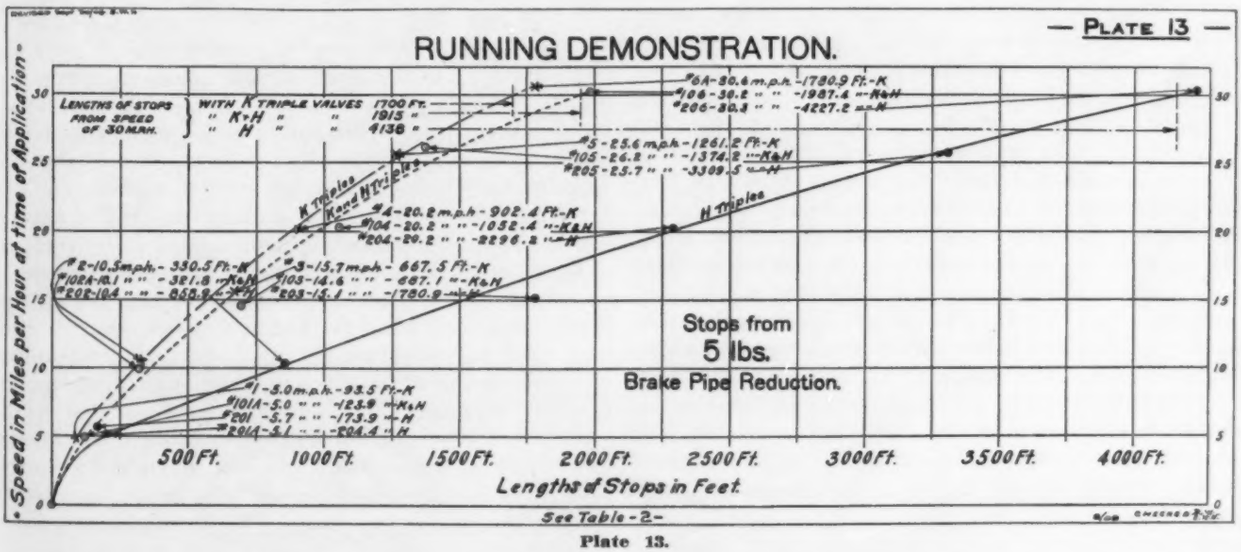


Plate 13.

in the middle, which would record blows incident to slack running in and jerks from the slack running out, and all of the observers were impressed with the improvement shown with the "K" triple valves.

Mr. Babcock: What does that do, the slack running in?

Mr. Bartholomew: There is a total of about seven inches of slack in every car. That in an 80-car train is quite a good many feet. The cars have that for free movement before the draft rigging is up solid, and that free movement, of course, if it is unhindered, is going to permit the cars to run in, compressing the draft rigging until all are up solid, which makes a considerable distance for the cars in the rear of train to run before being checked by the head cars. The cars, thus running free for a certain distance, cause a blow and that blow is what shoves the lumber through the ends of box cars and otherwise damages equipment and lading. The purpose of all of these demonstrations, as far as freight trains are concerned, was to show the different benefits coming from this improved time of serial action which has been explained to you—perhaps not as plainly as I should like.

(Part III, completing Mr. Bartholemew's article on "The Real Purpose of the Air Brake," will appear in our issue of June 5th.)

TEST ON GROWING OF EASTERN HARDWOODS IN CALIFORNIA.

The Pacific Coast will soon be the scene of an interesting tree growing experiment. The United States Forest Service is planning to introduce a number of the more important Eastern hardwoods into California, and will this year experiment with chestnut, hickory, basswood, red oak and yellow poplar or tulip trees. Small patches of these trees will be planted near the forest rangers' cabins on the National Forests, and if these do well larger plantations on a commercial scale will soon be established on wider areas.

There are over 125 different species of trees in California, a number of which produce some of the most valuable varieties of lumber in the country. Although considerably over one-half of the species are hardwood or broad-leaved trees yet, with the exception of the exotic eucalyptus, there is not a single species of hardwood here ranking in commercial importance with the leading Eastern hardwoods. Climatic conditions in many parts of California are undoubtedly favorable for the growth of a number of the valuable hardwoods, and the absence of these trees is due mostly to unfavorable factors of seed distribution.

If the experiments are successful, a valuable asset will have been added to the forest resources of this State, which should prove of special benefit to the local furniture and vehicle industries. Chestnut and red oak are highly esteemed for furniture, while with hickory, basswood, and eucalyptus at its command, California should lead all other States in the vehicle industry.

The electric conducting capacity of fire streams is a subject of general interest, so it may not be amiss to call attention to some comparatively recent experiments made by the Pennsylvania Railroad Company, which have shown that there is no danger of the current flowing down a stream of water even from a high-voltage line when the operator holds the nozzle at a distance of between three and four feet from the wire.

H. H. SINCLAIR, VICE PRESIDENT AND GENERAL MANAGER OF THE GREAT WESTERN POWER COMPANY.

H. H. Sinclair came to Southern California from New York City, July, 1887, and settled in Redlands, San Bernardino County.

In 1892 he helped organize and was made President and General Manager of Redlands Electric Light & Power Company, being personally in charge of all its construction work.

In 1892-93 said company installed and put in operation the first triphase power transmission plant in the United States—the second in the world—there being an experimental plant installed at Tivoli, near Rome, Italy. The Redlands plant has been in constant commercial use since its installation and the company has now on its system the first triphase generator, the first triphase synchronous motor and the first triphase induction motor ever put out by the General Electric Company.

In 1896 Mr. Sinclair began work on the plant of the Southern California Power Company, of which company he was President and General Manager.

This plant was designed for the transmission of 5000 k. w., 80 miles at 33,000 volts, and was a long step in advance of any transmission work then in existence or contemplation. At that time the longest distance was 45 miles and the highest voltage 15,000 volts. The many doubts expressed concerning the feasibility of this scheme and the absolute refusal of prominent engineers to endorse it make interesting history in view of its subsequent success. Mr. O. H. Ensign, now Chief Electrical Engineer of the United States Reclamation Service, was the electrical engineer on this plant, and to his judgment, indomitable energy, and great resourcefulness, a large amount of credit is due for the successful operation of the plant.

The next large work undertaken by Mr. Sinclair was the development of power on the Kern river in 1901, by the California Power Company, of which he was President and General Manager. This company, as also the two corporations above mentioned, were finally merged in the Edison Electric Company of Los Angeles, of which Mr. Sinclair is now Vice-President.

The Edison Electric Company under the active supervisions of Mr. Sinclair has installed on its system in addition to the pioneer equipment previously mentioned, the first oil break switches, the first revolving field generators, the first 12,000 volt generators, the first high potential measuring instruments, the first steel towers and the first steam turbines that ever came west of Chicago.

After completion of the Edison Company's 20,000 k. w. plant on Kern river in August, 1907, Mr. Sinclair gave up active business for a year, and in October, 1908, opened an office in Los Angeles for the examination of hydro-electric projects. Being a large stockholder of the Edison Electric Company, it is expected that he will still retain his position as a Vice-President and Director of that company. He will assume charge of the affairs of the Great Western Power Company on June 1st, with the position of Vice-President and General Manager.

CURRENT COMMENT

Motor Cars in Germany are taking the place of steam. Consul - General Richard Guenther, of Frankfort, writes that after lengthy experimental tests, the German government will now proceed to establish electric-motor car traffic on 52 sections of the railroad lines in Prussia and Hesse. The estimated average speed will be 31 English miles an hour, which, however, can be increased to 37½ miles. More new cars are to be built during this year in order to extend this method of traction.

Naval Tests of Wireless are being made by experts of the United States Navy who are bending every effort toward perfecting wireless equipment, both telephone and telegraph, for use by the vessels and shore stations. The military authorities also are carefully investigating this subject through the Signal Corps. Both the navy and the army will be represented at a series of experiments to begin about June 15 at Brant Rock, Mass., where a high-powered wireless station has been erected by a concern which is endeavoring to secure the work of building and equipping a 600-foot tower in Washington. Special requirements are exacted as to the distance capability of the apparatus used.

Lights Controlled by Wireless was an interesting feature at the recent Omaha Electrical Show; the exposition was lighted through wireless telegraphy during one evening, the first time that a large lighting current has been controlled without wires. The system is a discovery of Dr. Frederick Millener, wireless expert of the Union Pacific. Four thousand incandescent electric lamps were controlled from a wireless telegraph station at Fort Omaha, five miles from the building. A dozen times during the evening Dr. Frederick Millener turned on and turned off every light in the big building from his station. The current, as sent out from the government wireless station at the fort, was picked up by the antennae on the roof of the Electrical Building. From this it passed to a coherer, which in turn set the current to energizing a four-ohm track relay. This relay closed a circuit solenoid switch, thereby turning on a seventy-five horsepower current and the lights flashed on.

Tests of Meters in New York City, according to the report of the New York Public Service Commission for April, shows that there were 31,155 gas and 136 electric meters tested in all. Of the meters tested on complaint, 29.2 per cent were two per cent or more fast, 13.8 per cent were two per cent or more slow, and fifty-seven per cent were between these limits and are therefore adjudged to be correct. The number of meters tested is not given.

The above statement is interesting in connection with the report made under date of April 29th by A. M. Hunt and C. L. Cory to the San Francisco Board of Supervisors covering the result of test of gas meters in San Francisco. The investigation of this committee included the test of 24 meters regarding which complaints had been made and of which seven of the meters were found correct within one per cent; twelve were fast, the average being 2.87 per cent; and five were slow, the average being 4.2 per cent. The maximum percentage fast was six per cent, and the maximum percentage slow was seven per cent.

The first lot of electric locomotives which the Pennsylvania Railroad Company will operate in the tunnels of the New York terminals has been ordered from the Westinghouse Electric & Manufacturing Co. It is understood that these locomotives will combine the most desirable features of electric locomotive design as determined by the tests conducted by the company with locomotives of different types on the West Jersey & Seashore and the Long Island railroads, and by the manufacturers at East Pittsburg. These tests have represented the expenditure of more than $500,000. It is understood that the locomotives will be the most powerful electric locomotives ever built, and will be of the articulated type, each locomotive to consist of two units. Each unit will be equipped with one 2000 horsepower direct current motor mounted above the frames and connected to the wheels by connecting rods and side rods. The locomotives will be able to attain a speed of 90 m. p. h., and the first two to be built will be ready for test in the early fall. The present order will consist of 24 double units, but it is probable that more will be required soon after the terminal station is opened.

Successful achievements in radio-telephony are reported from Italy, where the Director of the Superior Institute of Postal Telegraphy of Rome, S. Quirina Majorana, has for some years been experimenting. One of the most important improvements invented by Signor Majorana is his ingenius liquid microphone, based on capillary phenomena, which cause the resistance between platinum electrodes to vary according to the sound emitted; this instrument has been applied successfully to ordinary telephony, permitting conversation between the Institute and London. The Poulsen arc system is employed in producing the necessary oscillation for wireless telephony, but many modifications have been introduced into both the transmitting and receiving apparatus by Signor Majorana. Telephonic communication by this system has been carried out between Monte Mario, Rome, and Anzio, Ponza and Maddalena, which are distant 60, 120 and 300 km. respectively, and between the same station in Rome and the torpedo-boat Lanciere, which was at the time about 200 km. distant. The voice reproduction was so clear in these experiments that by it the speakers could be recognized. The latest experiments of Signor Majorana have enabled him to "call up" Trapani, Sicily, which is 500 km. from the Institute. In view of these experiments, it appears to have been decided to establish three stations on this system at Naples, Cagliari and Palermo respectively.

JOURNAL OF ELECTRICITY
POWER AND GAS

PUBLISHED WEEKLY BY THE

Technical Publishing Company

E. B. STRONG, President
E. M. SCRIBNER, Vice President and General Manager
A. H. HALLORAN, Secretary and Managing Editor

DIRECTORS

R. J. DAVIS A. M. HUNT E. M. SCRIBNER C. L. CORY E. B. STRONG

604 MISSION STREET, SAN FRANCISCO.

TELEPHONE . . . . . KEARNY 913

TERMS OF SUBSCRIPTION

United States, Cuba and Mexico	per year,	$2.50
Dominion of Canada	"	3.50
Other Foreign Countries within the Postal Union	"	4.00
Single Copies, Current Month	each	.10
Single Copies, prior to Current Month	"	.25

NOTICE TO ADVERTISERS

Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon of Monday for the paper dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

FOUNDED 1887 AS THE
PACIFIC LUMBERMAN, CONTRACTOR AND ELECTRICIAN

CONTENTS

Frontispiece.....*Portrait of H. H. Sinclair* 422

Something About the "Teredo".....*By C. H. Johnson* 423

Electric Railways in Norway..... 424

The Real Purpose of the Air Brake, Part II.....
.....*By W. S. Bartholomew* 424

Part I of this paper appeared in our issue of May 22nd and the conclusion, Part III, will be published in our issue of June 5th.

Test on Growing of Eastern Hard Woods..... 430

H. H. Sinclair..... 430

A few words regarding his past and future work.

Current Comment 431

Motor Cars in Germany.
Naval Tests of Wireless.
Lights Controlled by Wireless.
Tests of Meters in New York City.
The First Lot of Electric Locomotives.
Successful Achievements in Radio-Telephony.

Editorial 432

Direct Current Motors at Portland.

Personal 433

Obituary 433

Death of George P. Low.

General Manager for the Great Western Power Company.... 433

Examination for Steam Engineer..... 433

The Proper Channels of Distribution of Electrical Supplies.. 434

A paper of the greatest interest to electrical manufacturers, jobbers and contractors, read before the meeting of the National Association of Electrical Jobbers, held at Del Monte, Cal., on April 24th, 1909.

Water Power in Oregon..... 435

Seattle Tries New Brake..... 435

Trade Notes 436

Industrial 437

Battery Charging with Mercury Arc Rectifiers.
The Fixtures for Whitney Building.

New Catalogues 439

Patents 440

News Notes 441

Direct Current Motors at Portland

With the completion of a new system of underground distribution and a new sub-station in the business section of Portland, Oregon, direct current is to be substituted for the present practice of alternating current distribution. This change is in direct accord with the concensus of expert opinion as to the best method for handling a concentrated load close to the sub-station. It eliminates the voltage drop due to self-induction or reactance in alternating current circuits. This loss, in the case of the heavy cables necessary for low voltage distribution, is often much greater than that resulting from the mere line resistance. With direct current the resistance loss is negligible on light loads, and even with increasing load the efficiency of distribution is higher than in an alternating current system in which the resistance drop is but a small part of the total.

Furthermore, direct current affords much better voltage regulation. This redounds to the benefit of the consumer in allowing the use of high efficiency lamps, for with poor regulation their life is considerably less than that of the lower efficiency incandescents. It has been noted that the tantalum lamps burn much longer when supplied with direct current, the filament disintegrating rapidly with the other. As the lighting load is usually a more important factor in municipal supply than is the power load, this advantage compensates for some of the disadvantages associated with direct current.

First among the latter is the necessity of replacing all existing induction motors by the direct current type. In the case of Portland there will also be a number of 500-volt machines to be taken out, as the distribution pressure is 220 volts. This requirement is undoubtedly a hardship on some individuals, especially if they have but recently installed new equipment. But insomuch as by far the greater part of the power load in this locality is for elevator service, with heavy starting torque and varying speed control, wherein the induction motor is a poor servant, this change will ultimately be beneficial to the consumer. As the starting current of an alternating current motor amounts to almost a short circuit the new system should greatly improve circuit regulation, particularly if the dynamos be supplemented by storage batteries. There should also be a material reduction in the current bills of the consumer whose charge is based upon the maximum demand.

One objection raised is that the direct current motor, with its attendant commutator and brush troubles, requires more expert attention than does the simpler and more reliable induction motor. Too often these have been operated upon the principle of "You touch the button and we do the rest." A printing office where the pressman operates the electrical apparatus, forms a typical example. But even here a little instruction usually suffices to set the matter right.

Our advice to salesmen, however, is not to include Portland and vicinity in their schedule if their specialty be alternating current motors. There will be enough second-hand machines of that type to supply the needs of outlying sections for years to come.

GENERAL MANAGER FOR THE GREAT WESTERN POWER COMPANY.

H. H. Sinclair, Vice-President of the Edison Electric Company, Los Angeles, will take up the general management of the Great Western Power Company with headquarters at San Francisco on June 1st. Mr. Sinclair has just returned from a trip around the world and after spending the past week in San Francisco has departed for his home in Pasadena where he will complete his arrangements for the transfer of his residence to San Francisco from which point he will direct the work of the Great Western Company.

The Edison Electric Company, which serves a large district in Southern California, is capitalized at $13,000,000, while the Great Western Power Company, generating power on the Feather River in the northern part of California, is capitalized at $50,000,000. As Mr. Sinclair will continue in his position as Vice-President of the Edison Company the new arrangement will at least insure friendly co-operation between the two companies.

The first work of note undertaken by Mr. Sinclair in the electrical field in California was in 1892 when he built the plant of the Redlands Electric Light & Power Company; since then several important plants in Southern California have been built under his supervision and since their consolidation he has taken an important part in the direction of the Edison Electric Company.

Mr. Edward P. Bryan, vice-president of the Great Western Power Company, who has been for the past four months acting as general manager of this company, has in the short time he has been here made many warm and sincere friends. Mr. Bryan had just completed the great subway running below the city of New York, one of the most arduous and difficult problems of engineering ever attempted in America since John A. Roeblings designed and constructed the Brooklyn bridge. Feeling in need of rest he had just planned to take a trip around the world, when the imperative necessity of some one to take the active management of the Great Western Power Company arose, and his associates persuaded him to come to California and take charge temporarily. Mr. Bryan will now resume his interrupted journey and leave for Honolulu and Japan within the coming month.

In the above arrangement San Francisco and Northern California gain a great acquisition to their already large list of financiers. While Mr. Sinclair brings to the North his vast experience and well known executive ability, yet his heart and home will always be in his beloved Los Angeles and Pasadena, where his early success in life made for him his fame and fortune.

While the Journal but echoes the sentiments of welcome of the entire community to Mr. Sinclair, there is at the same time a sincere regret at the loss to San Francisco of one of the most noted engineers of the United States.

PERSONAL.

H. H. Sinclair, vice-president of the Edison Electric Company of Los Angeles, spent the past week in San Francisco.

W. M. Carpenter, Vice-President of the American Cross Arm Company, Chicago, is now in the Northwest and is expected in San Francisco early next week.

R. J. Davis of the Standard Electrical Works, San Francisco, is now making his home at the University Club, his home in San Rafael being closed for the summer.

J. C. Kirkpatrick, president of the American Cross Arm Company, Chicago, and general manager of the National Pole Company of Escanaba, Mich., spent the early part of the week in San Francisco and left for Los Angeles on Monday night accompanied by C. H. Johnson, manager of the pole department of the Western Electric Company on the Pacific Coast.

Bradley A. Fiske, Commander of U. S. S. Tennessee, which has formed part of the Pacific fleet stationed at San Francisco during the past two weeks, is an electrical expert and an inventor of reputation. Practically all of his work in this line has been done under the direction of the United States Government. Among his inventions are the Fiske range finder, the Fiske position finder and the engine room telegraph, very generally used by the Navy.

OBITUARY.

George P. Low died at Mill Valley, Cal., on Sunday night, May 23d.

Mr. Low had a wide acquaintance upon the Pacific Coast as a result of his close affiliation with the electrical business during the past twenty-five years. He was a writer of considerable note, having been one of the founders of the Journal of Electricity, Power and Gas and for many years its editor.

He is survived by a wife and two children, a boy and a girl.

SECOND-CLASS (OR ASSISTANT) STEAM ENGINEER. CUSTODIAN SERVICE, JUNE 16, 1909.

The United States Civil Service Commission announces an examination on June 16, 1909, at the places mentioned in the list printed hereon, to secure eligibles from which to make certification to fill a vacancy in the position of second-class engineer, $900 per annum, in the Custodian Service at Macon, Ga., and vacancies requiring similar qualifications as they may occur throughout the United States.

The examination will consist of the subjects mentioned below, weighted as indicated:

Subjects.	Weights.
1. Letter-writing (a letter or not less than 150 words on some subject of general interest. Competitors may select either of two subjects given)	10
2. Practical questions in mechanical and electrical engineering (comprising the construction and operation of the heating plant and electric lighting and elevator machinery in first-class public buildings	65
3. Experience in mechanical and electrical engineering work	25
Total	100

Age limit, 18 to 55 years on the date of the examination. All honorably discharged United States soldiers and sailors of the war of the rebellion will be admitted to this examination without regard to the maximum age limit.

Persons who have suffered the loss of an arm or leg, who are ruptured, or who have other serious disability are considered physically disqualified for this position.

This examination is open to all citizens of the United States who comply with the requirements, but at the request of the Treasury Department, preference in certification may be given to legal residents of the county, including the city, in which the vacancy exists.

This announcement contains all information which is communicated to applicants regarding the scope of the examination, the vacancy or vacancies to be filled, and the qualifications required.

Applicants should at once apply either to the United States Civil Service Commission, Washington, D. C., or to the secretary of the board of examiners at any place mentioned in the list printed hereon, for application Form 1052. No application will be accepted unless properly executed and filed with the Commission at Washington. In applying for this examination the exact title as given at the head of this announcement should be used in the application.

As examination papers are shipped direct from the Commission to the places of examination, it is necessary that applications be received in ample time to arrange for the examination desired at the place indicated by the applicant. The Commission will therefore arrange to examine any applicant whose application is received in time to permit the shipment of the necessary papers.

THE PROPER CHANNELS OF DISTRIBUTION OF ELECTRICAL SUPPLIES.

The following paper was read at the meeting of the Pacific Coast division of the National Electrical Jobbers' Association held at Del Monte, California, April 24th, and formed the basis of the principal discussion of the meeting.

The purpose of the paper is purely educational, the object being to define the proper channels of trade and without lessening the distribution of manufactured product, to so arrange that distribution as to obviate the trouble and friction that must necessarily ensue when manufacturers or their agents interfere with or encroach on the distributing rights of the jobber or when the jobber takes from the contractor or retailer that which is legitimately his.

This paper was prepared by a special welfare committee appointed for that purpose.

In commercial life, there seems to come in the evolution and development of every line of manufacturing and distributing, a period of unrest; an uncertainty as to the natural and most economic method of distributing a manufactured article from the factory to the consumer. With the older lines of business, such as hardware, groceries, dry goods, etc., this question was long ago thrashed out and a very satisfactory conclusion reached from a theoretical standpoint, and it must be admitted a fairly satisfactory conclusion reached from a practical standpoint. From a strictly ethical view, the all important feature is, that the consumer, that great body that forms the ultimate support of all manufacturers, shall purchase his supplies at reasonable and economic prices. We use the word "reasonable" in connection with the word "economic," as the item of dollars and cents is not the only feature in purchasing that goes to make economy, but time, service and delivery are equally important.

The electrical supply business is comparatively new and its development has been very rapid in the last few years. The increased development of electric current, its advent in practically all civilized portions of the world, the lessened cost, and the multiplicity of uses brought into play have naturally increased not only the quantity but the variety of the output of manufacturers, and this process of evolution is still in rapid progress. With the widened distribution of the electric current and the enormous increase in application thereof, the question of economic distribution of those manufactured goods becomes of vital importance. Where formerly purchasers of electrical supplies were limited almost entirely to electric power and lighting companies, it was natural that business relations should be confined almost exclusively to the manufacturer and those purchasers. Other than this, electrical supplies were handled principally by contractors whose stocks gradually expanded to the magnitude of jobbing stocks. As time went on, it appeared that contracting was an operation distinctly separate from the jobbing business and at the present time the jobbers throughout the United States no longer engage in construction work. But with the expansion of electric power, however, into our mines, lumber mills and other industrial plants of infinite variety, electrical supplies become closely akin to general hardware, groceries, dry goods and other manufactured commodities that are distributed generally and widely to our entire population. As has been the case with these latter commodities, so it must naturally follow that the proper channels and the most economic channels for the distribution of electrical supplies must be:

First: From the manufacturer to the jobber or wholesaler;

Second: From the jobber or wholesaler to the contractor or retailer;

Third: From the contractor or retailer to the consuming public.

These channels have been justified time and again with other lines of trade and have been proven in the past, and can be proven in the present and in the future, the most reasonable and ultimately the most economic for all parties interested, that is, from the manufacturer clear down the line to the ultimate consumer.

A brief argument in justification of these ideas might be allowed. In the first place, the duty and province of the manufacturer is to originate and build, or manufacture certain commodities. He then seeks the line of least resistance in disposing of those commodities; he finds this channel in the jobber or wholesaler. By confining his sales to this class of buyer, his selling expense is maintained at a minimum, whereas, if he disregards the wholesaler, he must multiply his sales force and expense of distribution many times in seeking other classes of trade. Every manufacturer has a more or less limited line of commodities, while it is the province of the jobber or wholesaler to gather together as many lines of various manufacturers as are analogous and distribute them through one economic system. As the manufacturer finds, we will say some few hundred branches of distribution in the jobber, so the jobber finds many times those few hundred branches of distribution through the retailer or contractor. In other words, the latter are to the jobber exactly what the jobber is to the manufacturer. Just as in the previous case, if the jobber seeks the trade of the public, generally, he must increase his general force, and particularly his expensive selling force to such an enormous point as to treble or quadruple his cost of selling.

It must be admitted that in isolated cases where the consumer succeeds in making an occasional purchase from the jobber, he purchases at a lesser price than he would from his nearest retailer or contractor. Such isolated cases, however, in no way destroy this argument, for if the retailer or contractor were eliminated altogether, then the jobber would be the only source of supply for the general public, and the cost of distribution would necessarily be increased as already outlined. Therefore, we repeat that time and practice have definitely proven the most logical, reasonable and economic channels of distribution from manufacturer to the ultimate consumer, to be as herein stated.

From time to time there appear in trade journals articles apparently inspired by someone seeking to gain some temporary advantage over his competitors, claiming that the day of the wholesaler or middle man has passed, and this intermediate channel of distribution must give way to the more direct channel, from the manufacturer to the retailer or consumer. Such articles are apt to cause temporary interruption in the natural flow of trade, but the interruption is only temporary and manufacturers soon find that these inspired and visionary ideas are false in every detail and a proper resumption of the flow of trade results.

The elimination of the jobber and jobbing stocks would force the contractor or retailer to purchaser at long range, in some cases as much as 3,000 miles, from hundreds of manufacturers. His orders in most instances would be for less than minimum weight shipments, and the capital employed in his business would have to be doubled or trebled; his stock on hand would become extremely large and unbalanced, with the possibility of enormous shrinkage in values due to the everchanging character of "Code" staple articles.

This would seem to establish the fact that all interests involved, from the manufacturer to the ultimate consumer, are benefited or injured according to the harmonious or inharmonious relation of these interests to each other. Assuming that the manufacturer is sincere in his desire to confine his business to the jobber, the greatest trouble generally arises through the representative of the manufacturer, particularly in the person of the manufacturer's agent. Unless such representative is properly coached and is sincere and earnest in endeavoring to follow out the wishes of the manufacturer, constant friction and trouble between seller and purchaser must ensue.

Manufacturers' agents should be divided with a well-defined line into two classes. First: Agents representing large and responsible manufacturers whose commodities are distributed solely through the jobbing trade. Second: Agents or representatives of smaller factories, or those manufacturing only such specialties as are not handled or sold by the jobbing trade, but which through their very nature as specialties are handled direct to the retail, contracting or consuming trade. One great trouble is that manufacturers' agents frequently neglect to recognize the dividing line between these two classes, and agents handling a jobbing line should not handle a retail line. A definition of a legitimate manufacturers' agent, who, as such, is entitled to the jobbers' support, would seem to be in order here and we offer the following:

"An agent who confines his sales to jobbers exclusively on all articles carried in stock by any jobber in the locality where the manufacturer's agent operates."

The relation of the jobber to the contractor or retailer is a little more difficult to define, but the same general principles underlying the relations of the manufacturer and jobber must be applied. By this, we mean that just as the manufacturer and jobber should mutually respect each other's rights, so the jobber and the retailer or contractor should have the same mutual respect, and the jobber should not compete with the retailer just as the latter should not attempt to do a jobbing business.

It should be the duty of every jobber to see that the contractor or retailer is properly protected in his business not only as to purchasing, but by a well defined policy of non-interference with the strictly retail trade. The financial success of the retailer or contractor is essential to the financial success of the jobber just as the success or failure of the jobber must mean a profit or a loss to the manufacturer.

Much can be done to remove present difficulties if the contractor or retailer would confine his purchases exclusively to the jobbers in his locality, which would place him in position to demand of the jobber such consideration as would give him assured protection.

One of the greatest difficulties in this relation of wholesaler to retailer is to define classes of trade that should legitimately buy from the jobber or wholesaler as a part from those whose business should lie solely with the contractor or retailer, and as a step in this direction of defining the classes of trade that should be entitled to wholesale prices on electrical supplies, we offer the following:

"Those engaged in generating and distributing electric current, electrical contractors, dealers in electrical supplies or fixtures, steam and street railroad companies, steamship companies, Telephone and Telegraph companies, municipalities, branches of the U. S. Government, of the State Government, universities, ship building companies, oil companies, manufacturers who purchase electrical apparatus or supplies for resale in combination with their own product, industrial enterprises such as lumber manufacturing companies, mining companies, cement manufacturers. Purchasers other than the above should legitimately buy from the contractor or retailer."

While on the surface this definition seems to take in a large list of consuming buyers, still those buyers are of such magnitude and importance in their relation to the entire community as to warrant their consideration from the jobber or wholesaler. It is conceded that this condition is subject to change and correction as affected by time and progress, but practice and experience justify this position at the present.

WATER POWER IN OREGON.

In a recent government publication it is stated that the most important streams in Oregon for development of water power are those heading in the high, perpetual snow-clad Cascade Mountains and dropping rapidly to the sea level. Of these streams, the Deschutes River, having a minimum flow of 5100 cubic feet per second, and flowing through a narrow canyon in solid rock for 90 miles above its mouth, is the most important. This stream parallels the Willamette Valley and flows into the Columbia River 90 miles east of Portland. It has 3480 feet fall from Bend to its mouth, 500 feet of this being in the last 36 miles. Within this distance of 36 miles 290,000 theoretical horsepower can be developed. This, at the extremely low value of $10 per horsepower per year, would produce an annual revenue of nearly $3,000,000.

Hood River falls 740 feet in the last 11 miles of its course. It will furnish 2800 brake-horsepower per mile.

The McKenzie River has an average low-water flow of about 2200 cubic feet per second. Its fall is 11.5 feet per mile in the vicinity of Eugene and 26 feet per mile at Belknap Bridge. In the 39 miles above Hendricks Ferry its fall averages 16.7 per mile.

The North Fork of the Santiam River has a minimum flow of 727 cubic feet per second at Mehama. It falls 14.9 feet per mile in the vicinity of Mill City and 66.3 feet per mile near Idanha, 24 miles above. The average in this region is 37.5 feet per mile.

Fifteen thousand electric horsepower is now being developed at Cazadero, on the Clackamas River, and about 12,000 horsepower at Oregon City during the low water in the Willamette. At Gold Ray, in southern Oregon, on the Walla Walla River, and at Rock Creek, in eastern Oregon, large hydro-electric power plants are in operation. A large plant is being constructed near Portland, on the Sandy River.

SEATTLE ELECTRIC TRIES NEW BRAKE.

The Seattle Electric Company of Seattle, Wash., is experimenting on the West Queen Anne lines with an electro-magneto brake. The device has responded to all tests put upon it to date and the officers of the company state that if it proves as successful in Seattle as it has in other cities danger on the hill street car lines will be greatly lessened. A car equipped with the new brake and carrying officers of the company was run up and down Queen Anne hill recently without the use of the counterweight. The car was under control at all times. The tests will be continued for another two months, however, before the use of the brake is made general.

The brake consists of a shoe which rests on the track between the car trucks. Attached to this is a magnet, which is under control of the motorman by means of a "point switch." By throwing current into the magnet an attraction is set up between the rail and the shoe, which may be varied in intensity at the will of the motorman. The braking force is the friction between the shoe and the track, and also the pull of the magnet. The new brake is so arranged that if the trolley pole leaves the wire the brake automatically sets. The greater the speed of the car the harder the brake sets.

The particular feature of the new brake is that it does away with the flat wheel nuisance. As the device works on the track only, the wheels are never locked and cannot slide.

"The new brake," said E. E. Potter, general manager of the Seattle Electric Company, "has been indorsed by the British Society of Engineers and has been in use in Pittsburg, Los Angeles and other cities of the United States. The brake we are experimenting with is an advance over most of those now in use elsewhere. A similar device is used in Portland on the Portland Heights line and has given satisfaction.

"We are now experimenting with the brake to find its effect on the motors. As it releases when the current is off the motors and the motors work going down hill as well as up, there is a strain on them which may have an injurious effect. We want to see whether the insulation can stand the strain that is put upon it.

"Otherwise the brake works well. We will use it if it is found to be serviceable. We will use it on the Queen Anne lines as an auxiliary to the counterweight system. It is probable that it will be fitted to all cars which climb a grade of from 6 to 9 per cent."

TRADE NOTES.

It is stated that the orders of the General Electric Company since the first of February have been running at the rate of between $51,000,000 and $53,000,000 a year. The orders received in the last fiscal year aggregated $44,000,000, and in the fiscal year ended January 31, 1909, about $60,000,000. The management is of the opinion that orders for the current year will equal those reported in any year since the company was organized.

The Simmen automatic safety device, installed on the Atchison, Topeka & Santa Fe Railway in California some months ago, has proven satisfactory. This new invention entirely dispenses with the telegraph operator. Each train as it passes over the road automatically makes a record on a sheet in the train dispatcher's office. By means of red and green lamps and a gong the dispatcher can at any time signal direct to the engineer to stop, slow down or proceed.

The Arthur D. Little Laboratory announces the incorporation of their company under the name Arthur D. Little, Incorporated, for the purpose of operating a laboratory of engineering chemistry at 93 Broad Street, Boston. The business of this laboratory was established in 1886 and it is the present intention to extend their facilities and through its large staff of specialsits to undertake any work involving the application of chemistry to industry.

The Holophane Company of New York has moved its general offices, with the headquarters of the sales and engineering departments, to Newark, Ohio, where the Holophane Glass is manufactured. The business of the company has been handled up till now from New York city, but in the interests of prompter shipments and to better serve the steadily increasing market, the concentration of the entire organization was deemed advisable. The branch offices of the sales department, located in New York, San Francisco, Boston and Chicago, however, will continue as before. It is an interesting indication of Holophane system that only one working day was lost between the cessation of the business in New York and the opening in Newark. Practically the only inconvenience experienced by customers was due to delay caused by mail being misdirected to New York after the closing of the old office.

During the past ninety days Allis-Chalmers Company has taken contracts for upwards of thirty (30) steam turbines and generators, aggregating in capacity nearly 50,000 k. w. and negotiations are now pending for more than double that number. Among the orders recently placed is one for a unit of 2000 k. w. for the Public Service Corporation of New Jersey, to be installed at Camden, another of 2000 k. w. purchased by the Stone & Webster Engineering Corporation for the El Paso Electric Railway Company, El Paso, Tex., and a 2000 k. w. machine to be placed on a "repeat" order in the Public Service Station of the city of Columbus, Ohio.

Among the orders just booked are three gas engines aggregating 1000 h. p., direct connected to three Allis-Chalmers electric generators, for the Palmetto Phosphate Company, Tiger Bay, Florida; a gas engine of approximately the same size, with generator, for the Armstrong Cork Company's plant at Camden, N. J.; a 1500 k. w. gas driven electric unit and seven Standard 30,000 cubic feet gas driven blowing engines for various blast furnace plants.

In the power and electrical field figures obtained for March and April from the largest builder in this country of all types of prime movers, as well as of electric generators, transformers, motors, etc., viz.: Allis-Chalmers Company, show a large number of contracts for plants of moderate size, averaging about 400 horsepower, the aggregate of apparatus for which represents the enormous capacity of 61,985 horsepower. Among the larger purchasers are the San Angelo Water Works Company, San Angelo, Texas; Pacific Gas & Electric Company, San Francisco, Cal.; Northern Idaho & Montana Power Co., Sand Point, Idaho; Utah Light & Railway Co., Salt Lake City, Utah; Union Pacific Coal Co., Omaha, Neb.; Texas Pacific Coal Co., Thurber, Texas; El Tiro Copper Co., El Tiro, Ariz.; Intercolonial Railway of Canada, Moncton, N. B.. Particularly noteworthy of present activity is a contract placed with Allis-Chalmers Company by The Milwaukee Electric Railway & Light Company, John I. Beggs, president, for two 1500 k. w. motor-generator sets, one 500 k. w. balancer, six 2000 k. w. transformers, two 300 k. w. transformers, two 300 k. w. motor generator sets and a 300 k. w. generator of the water-wheel type, much of this apparatus constituting a "repeat" order.

Following the recent decision of the Illinois Supreme Court, which concluded the protracted litigation due to the disputed ownership of the stock of the Kellogg Swithboard & Supply Company, Chicago, the former owners of the company, including Milo G. Kellogg, who established the business, and his associates, are now in possession of the business and factory of the company. The American Telephone & Telegraph Company has restored to its previous owner every ceretificate of stock of the Kellogg Company. On April 27 the reinstated stockholders of the Kellogg Company met and elected a board of directors consisting of Messrs. Milo G. Kellogg, Francis W. Dunbar, Kempster B. Miller, Leroy D. Kellogg, J. B. Edwards, James G. Kellogg and Wallace L. DeWolf. All of these gentlemen, with the exception of Mr. DeWolf, are representatives of the old ownership of the company. The directors elected the following officers: President, Milo G. Kellogg; vice-president, Leroy D. Kellogg; secretary and treasurer, Seymour Guthrie; executive committee, L. D. Kellogg, Francis W. Dunbar and J. B. Edwards. This proceeding places the company back in the ranks of the independent telephone manufacturers. It is reported that the company is doing a large business. Mr. J. B. Edwards is the general superintendent and Mr. Francis W. Dunbar is the chief engineer.

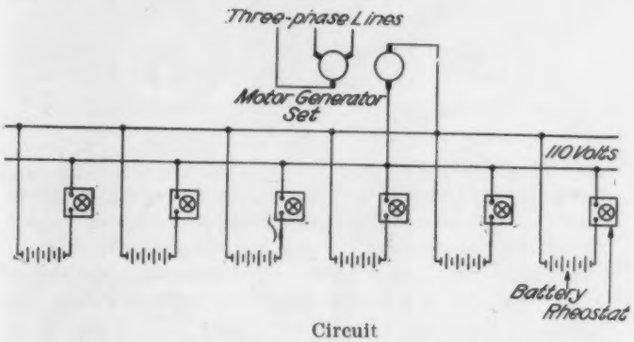
The effort that has been made by electric traction companies, despite the recent business depression, to keep their systems in good operating conditions, is not generally recognized; but one evidence recently brought to the attention of this paper is the fact that since January 1st, of this year, Allis-Chalmers Company, one of the largest builders of street and interurban railway apparatus, has received orders for nearly 1000 air-brake equipments. These include the company's latest type of straight air brakes for single car operation, straight air emergency equipment, combined straight and automatic air brake equipments for 2 or 3 car trains and automatic air brake equipments for electric locomotives and heavy interurban trains. Among the companies buying are the following: Tampa & Sulphur Springs Traction Company, Tampa, Fla.; Third Avenue Railway Company, New York; Tarrytown & White Plains Railway Company, White Plains. N. Y.; Yonkers Street Railway Company, Yonkers, N. Y.; Omaha & Council Bluffs Street Railway, Omaha, Neb.; Conestoga Traction Company, Lancaster, Pa.; Ogden Rapid Transit Company, Ogden, Utah; Atlantic Shore Line Railway Company, Kennebunk, Me.; General Construction Company, Omaha, Neb.; Sandusky, Norwalk & Mansfield Railway Company, Norwalk, O.; Shelbourne Falls & Colrain Street Railway Company, Shelbourne Falls, Mass.; Chester Traction Company, Chester, Pa.; Lebanon Valley Street Railway Co., Lebanon, Pa.; Rochester Railway Company, Rochester, N. Y.; Eastern Wisconsin Railway & Light Company, Fond du Lac, Wis.; Transit Supply Company, Minneapolis, Minn.; Chicago City Railway Company, Chicago, Ill.

INDUSTRIAL

BATTERY CHARGING IN AUTOMOBILE GARAGES WITH MERCURY ARC RECTIFIERS.

In many electric automobile garages having a capacity for charging two or more batteries at one time, the charging is done directly from direct current feeders or through a motor generator set from alternating current feeders. The general connections are similar to those shown in Fig. 1 either with or without the motor generator. There are a small number of garages using single curcuit rectifier outfits, one for each battery to be charged, but while this method is very satisfactory and highly efficient, the cost of the original installation is rather more than most garages care to invest for this purpose.

A large number of charging garages are now using the public garage type of rectifier, which is described later in this article.



	Circuit No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	Totals.
No. cells.....	44	40	30	24	16	12	166
Vols av.....	101	92	69	55	37	28	....
Amps. av.....	20	20	20	20	20	20	120
Watts used	2,020	1,840	1,380	1,100	740	560	7,640
Watts lost.....	180	360	820	1,100	1,460	1,640	5,560
Watts total	2,200	2,200	2,200	2,200	2,200	2,200	13,200
Per cent. eff.....	92%	84%	63%	50%	34%	25%	58%

Fig. 1. Diagram of Connections and Table for Charging Batteries From Motor Generator.

Referring again to Fig 1, let it be assumed that six batteries are to be charged from the 110 volt circuit, and that the number of cells in the various batteries is as follows: No. 1, 44; No. 2, 40; No. 3, 30; No. 4, 24; No. 5, 16; No. 6, 12. The tabluation in Fig. 1 shows the actual watts delivered to the battery, the watts lost in the rheostats and the efficiency of each circuit, neglecting the loss in the motor generator set. It will be seen from the last column that the efficiency of the complete system, exclusive of the motor generator set will be about 58 per cent; with the motor generator set having an approximate efficiency of 75 per cent, the efficiency of the system will average about 44 per cent.

The public garage type of mercury arc rectifier is shown in Fig. 2. This outfit is designed for use on a 220 volt 60 cycle alternating current circuit and consists of a two-panel dull black slate switchboard with necessary regulating compensator, reactance, equalizing rheostats, rectifier tubes and necessary switches, all suitably mounted with a view to obtaining the most compact and convenient equipment possible. The left-hand panel of the switchboard is known as the rectifier controlling panel and on it is mounted the apparatus particularly essential to the starting of the rectifier tube and regulation of the rectified current.

The right-hand or charging circuit panel is equipped with six triple pole double throw switches which lead to the various charging circuits, two 60-amp. ammeters and a 6-point voltmeter switch for adjusting one of the voltmeters on the left-hand panel for reading the voltages of the various batteries being charged.

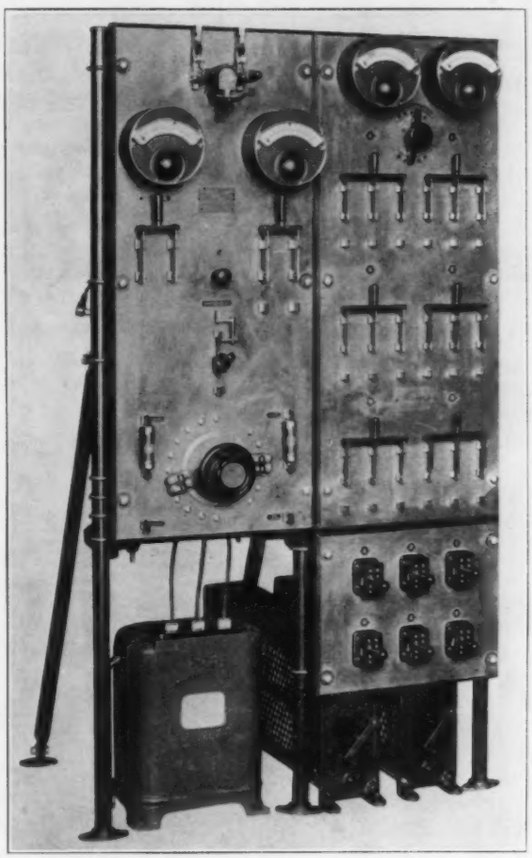
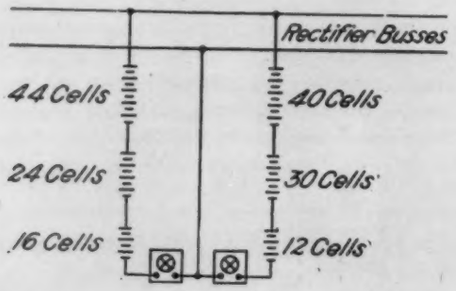


Fig. 2. Public Garage Type of Rectifier.

The general scheme of connections of the charging circuits on the garage panel is outlined in Fig. 3. The rectifier when charging a group of batteries similar to that shown in Fig. 1 would supply an average of about 193 volts on the charging circuit. It will be noted from Fig. 3 that the six batteries are arranged in two circuits of three batteries each, the batteries being equally divided between the two circuits. The tabulation just below the diagram gives the losses and efficiencies when charging with these connections. It will be noted from this table that the average efficiency of the charging circuits alone neglecting the very small losses in wiring is 99 per cent. As the efficiency of the rectifier when delivering 193 volts is about 84 per cent, the total combined efficiency if the complete charging equipment would be about 82 per cent.

Referring to the table in Fig. 1, it will be seen that

the total watts used in the charging circuits is 13,200. At 75 per cent efficiency this would mean an input to the motor generator set of about 17.6 kilowatts. The input to the rectifier under the conditions shown in Fig. 3 would be about 9.2 kilowatts, representing a saving of 8.4 kilowatts for each hour of operation under similar conditions. Of course, a small part of



	Circuit No. 1.	No. 2.	Totals.
No. cells	84	82	166
Volts av.	193	189	....
Amps. av.	20	20	40
Watts used	3,860	3,780	7,640
Watts lost	0	80	80
Watts total	3,860	3,860	7,720
Per cent. eff.	100%	98%	99%

Fig. 3. Diagram of Connections and Table for Charging Circuits for Garage Outfit.

this saving would have to be used for buying renewal tubes for the rectifier, but even considering the slight additional expense, the saving in power could figure out at least 20 or 25 per cent.

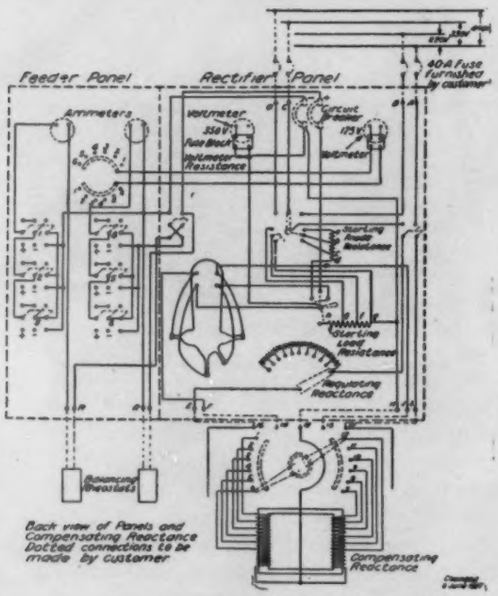


Fig. 4. Diagram of Connections of Rectifier Outfit for Garage Service.

While some garage operators might consider the combination of cells given in the foregoing example as an unfavorable case, it should be borne in mind that batteries of the various number of cells mentioned are furnished by representative electric vehicle manufacturers for use in their "Electrics." Nor is it possible for a garage to control the conditions and make them most favorable to the charging plant; for example, garages are frequently called upon to charge a single battery with a large number of cells, say a 40-cell battery, and a large number of batteries with a smaller number of cells, for instance, 5-24-cell batteries. When charging such a group of batteries from a 110-volt direct current circuit, the efficiency would be about 44 per cent. When charging the same batteries with a rectifier, the efficiency would be about 75 per cent.

The following tabulation of efficiencies when charging various sizes of batteries is given below. For the sake of comparison, the charging rate on all batteries is taken as 20 amps. and the average volts per cell as 2.3. While some batteries are designed for a heavier charging rate, the average battery can be efficiently and economically charged at this rate, although the time of charging may be somewhat longer.

There are, of course, almost innumerable combinations of batteries possible, but the above will give the general basis for comparison between the various methods of charging.

It will be noted from Fig. 4, which is a complete diagram of connections of the rectifier garage set, that when a battery is connected to the terminals of each of the triple pole switches marked and and the switches thrown in the upper position, the batteries are connected in two series groups similar to Fig. 3. If all the 12-cell batteries are to be charged at one time they may be charged in series by simply reversing the position of a double pole, double throw switch on the left-hand panel. For practically all charging, however, the circuits will be connected in series multiple as shown in Fig. 3.

In each of the two series charging circuits is connected a 60-amp. ammeter and a rheostat for equalizing the current between the two circuits. In order to use as little of the resistance as possible the number of cells of battery should be arranged to be as nearly equal as practical. When it is desired to cut out a battery for any reason the switch to which this battery is connected should be opened, a sufficient amount of the charging rheostat cut in and the switch thrown into the upper position. This cuts out the battery, but the series circuit is not broken and the charging of the remaining batteries will be continued.

A sub-base shown below the right-hand section in Fig. 2 is sometimes furnished. This sub-base is equipped with six non-reversible plug receptacles and six charging plugs. To these plugs should be attached six charging cables leading to various points in the garage. The use of this sub-base permits of readily changing the various batteries under charge from one circuit to the other in order to make the most efficient combination without moving the vehicles from place to place in the garage.

With this type of rectifier it is possible to charge at one time a total of 180 cells of lead plate battery at 20 amps. each.

About 30 of these garage panels are now in actual service, giving excellent results and proving that the above efficiencies outlined are not merely theoretical.

FIXTURES FOR WHITNEY BUILDING.

The contract has been placed for several hundred lighting fixtures for the new Whitney Building now under construction on Geary street, San Francisco. They are to be the new type

New Benjamin Fixture.

of fixture manufactured by the Benjamin Electric Manufacturing Company of Chicago and contract calls for their complete equipment with Holophane E type reflectors and Benjamin angle sockets fitted for tungsten lamps.

This is a new type of fixture recently brought out by the Benjamin Company and is shipped packed one in a box, wired complete, ready for installation.

NEW CATALOGUES.

Keuffel & Esser Company of Hoboken, N. J., has issued the 33d edition of its catalog of drawing materials and surveying instruments. A new feature of the catalog is a special section for drafting office furniture, which now forms an important department among the goods manufactured.

The Westinghouse Air Brake Company has issued a new instruction pamphlet entitled "The Type K Triple Valve." The book is known as Instruction Pamphlet No. 5030 and contains a complete description, with drawings, of the latest design of this valve, together with instructions for its installation and operation.

The General Electric Company is just issuing a Bulletin devoted to Tungsten Economy Diffusers, which supersedes a previous publication on this subject. The new Bulletin, No. 4660, goes more into detail and contains illustrations of this diffuser in connection with fixtures of various designs. This publication will be of interest to those contemplating the use of Tungsten lamps.

The Sterling Varnish Company of Pittsburg, Pa., has issued a "Catalog of Insulation," in which the company's various materials are described and the directions for their use given, making the booklet or practical value. Among the company's products are extra insulating varnish, black plastic insulator, Motorlac, extra black finishing varnish, black armature lacquer, black air drying varnish, black core plate varnish and black insulating paint. The contents of the catalog also include the care of insulating compounds and their thinning, comparison of thermometerical scales, comparison of Beaume and specific gravity scales, specific gravities, solvents, baking and dipping coils, dipping tanks and baking ovens.

The H. W. Johns-Manville Company of San Francisco, Seattle and Los Angeles, are distributing a very tasty little pamphlet descriptive of the J-M Permanite Sheet Packing. It calls attention in a brief way to the various conditions under which this material can be used to advantage.

The H. W. Johns-Manville Company are distributing as the latest issue from the J.-M. Press a pamphlet entitled "A Story in Black and White." It treats of J.-M. asbestos roofing, giving briefly some interesting facts relating to the mining of asbestos, the plants where asbestos roofing is manufactured and some details covering the method of manufacture and the advantage of its use.

The Standard Engineering Company, 69 Natoma street, San Francisco, has issued a very attractive reprint of the article on a "Modern Hospital Power Plant" which appeared in the "Journal of Electricity, Power and Gas," under date of of April 17th. It covers a complete description of the installation of the power plant in the new Southern Pacific Hospital at San Francisco and a copy will be mailed on request to any one interested.

The Electric Storage Battery Company, Philadelphia, Pa., and San Francisco, has instituted a campaign consisting of a series of newspaper advertisements for central stations who want more power business. This series include a fine line of forceful, illustrated advertisements, bringing out the utility and feasibility of operating electric carriages and electric power wagons. The plates are so arranged that all that is necessary for use in any city is the setting up of the name of the central-station company.

The General Electric Company has recently issued Bulletin No. 4658 describing the Type US-14 Ball Bearing Trolley Base. The type of double ball-bearing used on this base produces an extremely sensitive action which, by eliminating the arcing, pounding, wrenching, etc., inherent in ordinary forms, insures, a minimum wear on trolley wheel and overhead construction. A cushioned stop is provided to protect the pole from bending or breaking should the wheel leave the wire. This publication contains, also, a list of supply parts for this base.

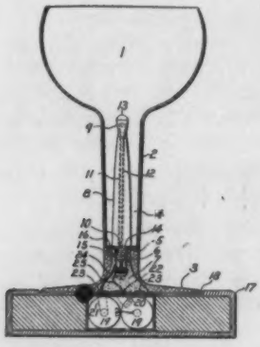
In Bulletin No. 4659, just being issued by the General Electric Company, are described some switchboard instruments for use on alternating current circuits, and constructed on the induction principle. Ammeters, voltmeters and wattmeters are made in this type of instrument, and are constructed so as to be uninfluenced by stray fields. Indications of the pointer are rendered "dead beat" and the scale extends through an arc of 300 degrees and is practically uniform throughout. This Bulletin contains catalog numbers, prices and dimensions of this instrument.

The Fort Wayne Electric Works, Fort Wayne, Ind., calls particular attention to the following bulletins just put out: No. 1112, on Type D. C. P., enclosed direct-current arc lamps, Form C, for operation on power circuits; No. 1115, on single-phase intergrating induction wattmeters; No. 116, on Type DCM enclosed direct-current multiple arc lamps. All are handsomely illustrated and complete in technical detail. The company is the well-known manufacturer of the "Wood" systems, and any pamphlet sent out by its publication department is worthy the closest attention.

Circular 1502 issued by the Westinghouse Electric & Manufacturing Company contains much valuable information on alternating current distribution covering transformers, lightning arresters, insulators, cross arms, etc. Considerable space is devoted to underground and overhead construction applicable to congested and scattered districts. There is also given information on potential regulating systems. The circular contains 52 pages of information of value to any central station man or any other connected in any way with the distribution of power by alternating current lines.

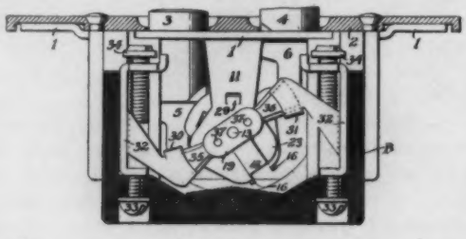
PATENTS

919,691. Electrically-Illuminated Drinking-Glass. Joseph H. Cahill, St. James, N. Y. In a drinking glass having an opening extending from the bottom of its bowl through its stem and base, the combination with a glass tube, an incandescent electric lamp in the upper end of said tube, a plug at the lower end of said tube and conducting wires leading



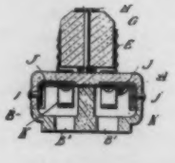
therefrom within said tube to said lamp, a lamp socket secured within said opening in the glass adjacent to its base and electrically and mechanically connected with said lamp and supporting said tube and lamp, a sub-base for the glass, an electric battery within said sub-base, and electric conductors between the said battery and lamp socket whereby the incandescent electric lamp is illuminated.

921,050. Snap Switch. James H. Wyatt, Philadelphia, Pa., assignor to William M. Scott, Philadelphia, Pa. In a snap switch, the combination with a pivoted contact carrying member, of a detent member engaging and rotating with the same, ears upon said detent member, a spring en-



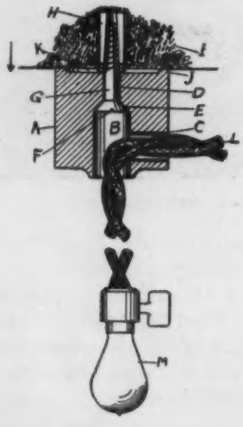
gaging said ears to hold said detent member in normal position, an operating spring, a spring winding member, and a projection on said spring winding member disposed between said contact carrying member and its axis of movement for engaging said ears upon said detent member to shift the same.

921,196. Detachable Plug. Puzant R. Yuzuk, New York, N. Y., assignor to General Electric Company, Schenectady, N. Y. In a detachable plug, the combination of an insulating



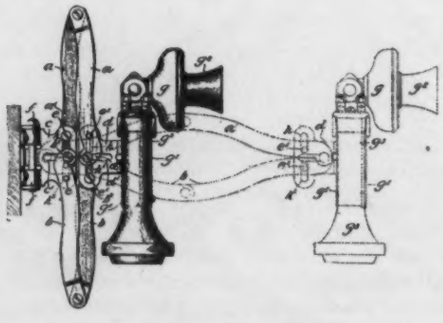
base portion, contacts mounted on the front side thereof, means located on the back side of said base portion for securing it to a socket and electrically connecting said contacts to the circuit, a terminal bearing portion readily detachable from said base portion and said contacts, a fuse link interposed in the circuit and carried by said base portion on its front side, and a cover secured to said base portion and situated between the front side of said base portion and said terminal bearing portion, said cover having openings for the terminals of said terminal bearing portion.

921,038. Ceiling Rosette for Drop Electric Lamps. William Wilbraham, Chicago, Ill. A rosette consisting of a block of insulating material having an axial passage extending through the block and a lateral perforation in the wall of the passage, said passage being provided with an internal shoulder



above the lateral perforation to receive the head of an attaching screw inserted in the passage; whereby the block may be secured to a wall by such screw and a conductor may be passed through the perforation and thence downward in the open portion of the passage, substantially as set forth.

921,367. Adjustable Bracket. Edward B. Craft, Chicago, Ill., assignor to Western Electric Company, Chicago, Ill. An adjustable supporting bracket comprising opposed toggle levers pivotally united at their ends, supports for said levers having main slots in which said pivots reciprocate, said



supports having slots therein at right angles to said main slots, and pins carried by said levers adapted to travel in said angular slots, whereby compound tram movements may be imparted to said levers, and force applied to said bracket other than in the direction of contraction or expansion is incapable of varying the adjustment thereof.

NEWS NOTES

FINANCIAL.

LONG BEACH, CAL.—The Alamitos Water Company has issued bonds to the amount of $200,000 for improving its system.

OAKLAND, CAL.—The Burk's Oil Company has levied an assessment of five cents per share on the capital stock of the company.

SAN FRANCISCO, CAL.—The Olympic Salt Water Company has levied an assessment of $1 per share on the capital stock of the company.

VISALIA, CAL.—The Wutchumna Water Company has levied assessment No. 131 of $10 per share on the capital stock of the company.

SAN FRANCISCO, CAL.—The Apollo Oil Company has levied assessment No. 1 of two cents per share on the capital stock of the company.

GLENDALE, CAL.—Bonds have been issued by the city council of this city to the amount of $60,000 for the construction of municipal electric light works.

OAKLAND, CAL.—The Central Oakland Light & Power Company has applied for permission to increase its bonded indebtedness by $800,000. The company proposes to increase its systems and acquire additional facilities in the near future.

INCORPORATIONS.

FRESNO, CAL.—The Merrill Oil Company has been incorporated here with a capital stock of $250,00 by A. L. Weil, M. Syme, L. Behrendt and Jesse Mueller.

SAN FRANCISCO, CAL.—The Economic Gas Company has been incorporated here with a capital stock of $1,500,000 by D. O. Druffel, H. P. Eberhard and Nicholas Bowen.

EUREKA, CAL.—The Pacific Oil & Fuel Company has been incorporated here with a capital stock of $10,000 by A. C. Dauphiny, A. C. Barrett, A. I. Streeter, and L. Dauphiny.

FRESNO, CAL.—The Boychester Oil Company has been incorporated here with a capital stock of $100,000 by W. C. Rielly, A. E. Shaw, C. T. Buss, J. B. Derruette and S. R. Adams.

FRESNO, CAL.—The Clovis Oil Company has been incorporated here with a capital stock of $100,000 by C. E. Boyd, I. S. Knight, T. W. Pond, A. G. Ehman and L. L. Eversoll.

LOS ANGELES, CAL.—The Newport Bay Electric Light & Power Company has been incorporated here with a capital stock of $50,000 by W. H. Paden, C. H. Ghrist and W. W. Crosier.

SAN FRANCISCO, CAL.—The Stauffer Oil Company has been incorporated here with capital stock of $100,000 by C. d'Guigne, John Stauffer, P. de Tristian, W. Bork and R. M. Lyman.

FRESNO, CAL.—The St. Elmo Oil Company has been incorporated here with a capital stock of $500,000 by R. C. P. Smith, Harry Jackins, G. W. Henderson, J. T. Cleary and B. L. Oliver.

SACRAMENTO, CAL.—The American Canyon Water Company has been incorporated here with a capital stock of $1,000,000 by W. O. Bowers, M. A. Nurse, Chas. Cunningham, H. W. Conger, F. L. Atkinson, S. F. McNear, A. L. Darrow, J. H. Huffum, George P. Robinson, H. L. Bissell and R. E. L. Stephens.

LOS ANGELES, CAL.—The Gas Supplies Company has been incorporated here with a capital stock of $20,000 by G. B. Laughlin, M. H. French, I. O. Jacobs, T. C. Powell and C. M. Roberts.

BAKERSFIELD, CAL.—The Twenty-three Oil Company has been incorporated here with a capital stock of $500,000 by H. E. Wright, H. W. Thomas, W. H. Morris, T. M. Young and W. B. Bealzley.

SACRAMENTO, CAL.—The American Irrigation Company has been incorporated here with a capital stock of $250,000 by George P. Robinson, H. A. Buffum, F. L. Atkinson, J. F. Azevedo, O. G. Hopkins, W. F. Gormley and C. A. Haines.

SAN FRANCISCO, CAL.—The stockholders of the United Railways Investment Company have approved the purchase of the Stanislaus Electric Power Company and propose to organize a new company, which will be known as the San Francisco Electric Railways Company, with a capital stock of $10,000,000. This property, which was recently bought at auction for $2,200,000, will furnish the United Railways of this city with 45,000 horsepower. The company announces a number of important surburban improvements, which will include a large part of the peninsula.

ILLUMINATION.

COALINGA, CAL.—A. W. Smith and S. H. Hain have been granted a gas franchise on certain public highways in this city.

SANGER, CAL.—The Sanger Electric Light Company has filed its application for dissolution in the Superior Court of this county.

LOS ANGELES, CAL.—Bids will be received by the Board of Supervisors for a fifty-year gas franchise in certain portions of Los Angeles County.

MODESTO, CAL.—Superintendent Archie Scott and Attorney W. H. Hatton of the La Grande Light & Power Company, have purchased a tract of land here where sub-stations for the company will be erected.

FORT BRAGG, CAL.—The Fort Bragg Electric Light Company has decided to enlarge its electric light plant and will install a 750 k. w. generator and steam turbine during the summer. The company will also erect another transmission line from Fort Bragg to Mendocino to improve the service.

OIL.

GRESHAM, CAL.—The Gresham Oil & Developing Company is getting stock on the market and arranging for material for putting down an experimental well.

BAKERSFIELD, CAL.—The Superior Oil Company has declared its eighth dividend of $5000, or 1 cent a share. This makes a total of $40,000 paid to the stockholders in dividends.

COALINGA, CAL.—S. W. Morsehead, H. H. Welsh, L. P. St. Clair and M. W. McJuigg, announce plans for a new pipe line to be built soon to carry the production of the independent oil producers of Coalinga and the Kern County field to tidewater.

BAKERSFIELD, CAL.—The Johnson Oil Company, on the Maricopa field, has struck at a depth of 56 feet a production of light oil with abundant gas pressure. The well started flowing at an estimated rate of 500 barrels a day. No sign of water has yet been found and the company will continue drilling.

TRANSMISSION.

DOWNIEVILLE, CAL.—Walter Painter and Homer Gould have located 15,000 inches of water from the North Yuba River, just below this place. The water is to be used to develop electric power for mining purposes.

AZTEC, NEW MEX.—A bill has been introduced into the House providing that the Secretary of Treasury spend $300,000 for the construction of an electrical power plant at Deming, for furnishing power for an irrigation project.

REDDING, CAL.—The Sacramento Valley Power Company has bought the water rights owned by some half dozen pioneer farmers on the North Battle Creek, for $100,000. The company plans using every inch of the water to generate electrical power, thus increasing its output from 3600 horsepower to 15,000 horsepower.

RED BLUFF, CAL.—Two more notices of appropriations of water have been filed with the county recorder. E. W. Stores has filed on 20,000 inches of water to be diverted about 14 miles above the junction of Mill Creek and Little Mill Creek, the water to be used in generating electric power; and W. D. Russel has applied for 500 inches of water from Bennet Creek, to be used in generating electrical power.

PLACERVILLE, CAL.—Jacob Snow has filed here with the county recorder a notice of location and appropriation of 15,000 inches of water flowing in the South Fork of the American river, the water to be taken out just below the lower plant of the American River Electric Company. Mr. Snow will divert the water and conduct it a distance of two miles to a point where a location has been secured for an electric power plant.

WATER.

PIONEER, NEV.—The Pioneer Water Company has secured a water franchise for supplying this city with water from Bryan's Springs.

OAKLAND, CAL.—The Board of Public Works awarded a $34,000 contract to Cotton Bros. for the laying of pipes for the salt water fire protection system.

OAKLAND, CAL.—Bids will be received by the Board of Public Works till June 2, 1909, for furnishing material for the salt water high pressure fire system to be built in this city.

KING CITY, CAL.—Manager Baird of the King City Water, Light & Power Company, was in San Francisco this week purchasing machinery for increasing the capacity of the plant to 200,000 gallons per day.

LOS ANGELES, CAL.—Attorney Cassius Carter has served notice on the Board of Public Works that he will bring suit to prevent the awarding of a $68,000 water-pipe contract to the Western Metal Supply Company on the ground that the city was in error in not advertising for bids.

OAKLAND, CAL.—The management of the People's Water Company has passed into new hands. Four new directors were elected at a meeting held last week, H. C. Capwell, J. Y. Eccleston, L. G. Burpee and A. W. Naylor. The directors who resigned were E. A. Heron, W. F. Kelly, John H. Spring and Louis Titus. The new board, it is announced, proposes to effect a complete reorganization of the company's affairs. Plans have been outlined which will involve considerable expenditure for permanent improvements and development of water sources of supply.

PETALUMA, CAL.—The following bids have been received for furnishing a pumping plant for the salt water fire system in this city. The Corliss Gas Engine Company of Petaluma, 300 horsepower motor and 8-inch pipe, $4,190; the Western Electric Company of San Francisco, $1,540 on motor, $700 on starter, and $108 for extras; the Nevada Machinery & Supply Company of San Francisco $3,870 for pump and motor; the Union Iron Works, San Francisco, pumping plant $2,825, motor additional, $1,601; The Byron Jackson Iron Works, San Francisco, $3769 complete; Fairbanks, Morse & Co., San Francisco, induction motor, $1,600; The Krogh Manufacturing Company, $3,875 complete, or $2,275 without the motor; Henry R. Worthington, $2,505 for pumping plant and wrought pipe or $3,980 with motor; Allis-Chambers Company, San Francisco, $4,620 complete; The Westinghouse Company, San Francisco, motor $1,461; The California Hydraulic Engine & Supply Company, San Francicso, $4,635; and Harron, Rickard & McCone, San Francisco, $4,830 complete.

TRANSPORTATION.

MONTEREY, CAL.—H. R. O'Bryen has applied for an electric street railway in the County of Monterey.

SAN BERNARDINO, CAL.—John M. Morris has applied for an electric franchise over certain rights of way in this city.

GARDNERVILLE, NEV.—A. J. Jensen and H. H. Springmeyer have applied for a street railway franchise in this place.

PHOENIX, ARIZ.—The Suburban Railway Company has been granted an electric railway franchise on certain highways in this city.

BERKELEY, CAL.—The Oakland Traction Company announces an extension of its Northbrae electric line to Ocean View in the near future.

UPLAND, CAL.—A. P. Harwood, representing the Pomona and Upland Electric Railway, announces that grading for the new road will begin on June 1st.

TEHAMA, CAL.—Following the application of J. J. Worthington bids will be received in this city for the sale of an electric railway franchise on certain public highways.

VACAVILLE, CAL.—President T. C. Gregory of the Vallejo & Northern Electric Company, has asked for a renewal of the company's franchise in this city. He states that the company has secured the last of its franchises in Sacramento and within 90 days will spend $10,000 in work on their right of way in that city.

OAKLAND, CAL.—Chief Engineer Boggs of the Oakland Traction Company has assured the Board of Public Works that the company would give the city its support in the proposed improvements about Lake Merritt. The traction company has agreed to lay its tracks further apart and keep the boulevard well oiled and paved. It also intends to place the power poles in the center of the street, between the tracks. These poles will be ornamental, with extending arms to carry the power wires and on each pole an electrolier will be placed.

TELEPHONE AND TELEGRAPH.

SALINAS, CAL.—John L. Mathews has been granted permission to erect a telephone line between the Rancho Canada de San Lorenza and King City.

MARYSVILLE, CAL.—It is announced that the Pacific Telephone Company has purchased a site in this city and will erect an office building thereon.

PRESCOTT, ARIZ.—The Arizona Overland Telephone Company has purchased the franchise of Robert Brow, M. Hickey and H. T. Andrews here for a telephone and electric system.

BAKERSFIELD, CAL.—Following the application of the Kern Mutual Telephone Company, bids will be received by the Board of Supervisors up till June 7th, for the sale of a telephone franchise in this city.